

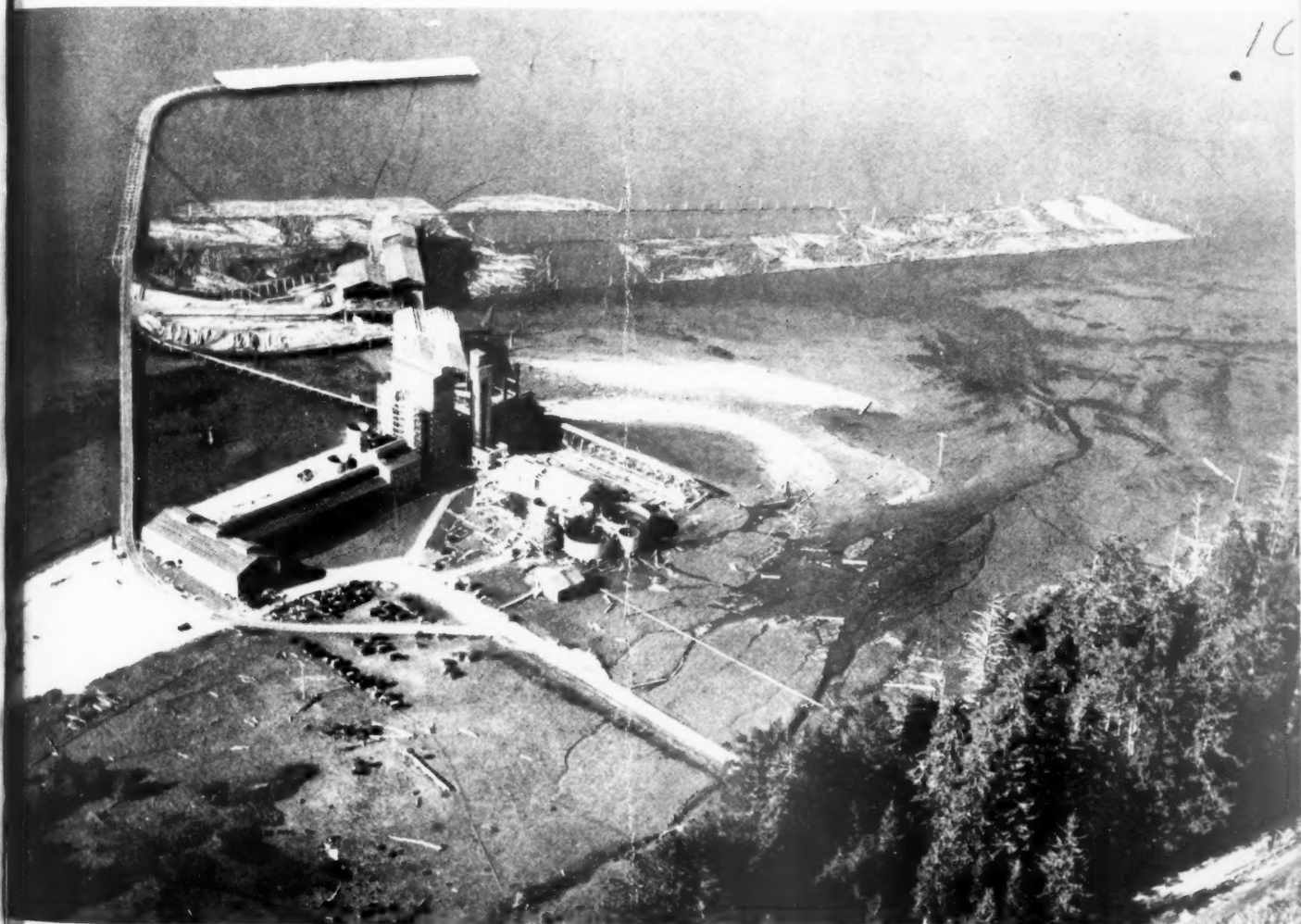
PACIFIC PULP *and* PAPER INDUSTRY

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Volume 3
Number 13

DECEMBER, 1929

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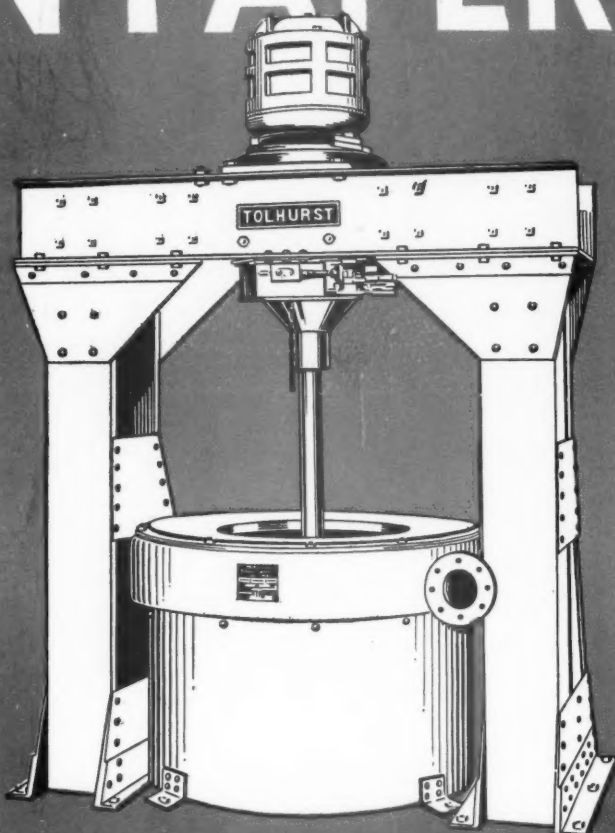
Aerial Surveys, Portland

EMPIRE, OREGON

The Sitka Spruce Pulp & Paper Co., starting production last month, opens a new region on the Oregon Coast for pulp manufacture.

CLEAN PAPER

**THE TOLHURST
CENTRIFUGAL
DOES WHAT A
MILE OF RIF-
FLERS CAN-
NOT DO . . .
IT TAKES ALL
IMPURITIES
OUT OF THE
STUFF!**



This machine is made under license of the Centrifugal Engineering and Patents Corporation, holders of the Erkensater patents.

The Tolhurst Centrifugal by multiplying the force of gravity by hundreds naturally does that which a sand trap cannot do.

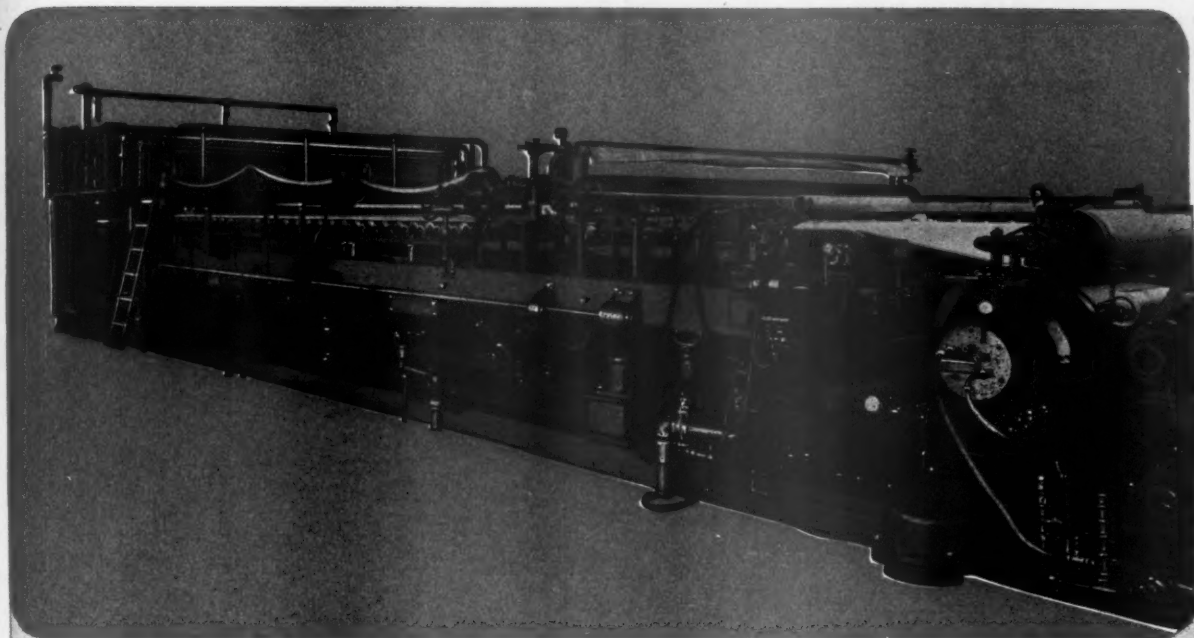
TOLHURST, in this machine, brings to the paper industry the same specialized knowledge of centrifugal engineering that has made the name **TOLHURST** a synonym for excellence in the chemical, textile and other industries.

Write for the Tolhurst Bulletin which describes this machine, its economies, production advantages and profit possibilities.

**TOLHURST MACHINE WORKS, INC.
TROY, N. Y.**

New York Office: 30 Church Street
Chicago Office: 8 So. Dearborn Street

Pacific Pulp & Paper Industry is published once a month—except in March, when publication is semi-monthly—at 71 Columbia St., Seattle, Wash. Subscription: U. S. and Canada, \$4.00; other countries, \$5.00. Entered as second class matter May 20, 1927, at the Postoffice at Seattle, under the Act of March 3, 1879. Vol. 3, No. 13, December, 1929.



HAMMERMILL *Presses the Button* *and the Fourdrinier Rolls Out*

AT Hoquiam, Wash., *Hammermill Bond* is enjoying the benefits of the modern removable Fourdrinier and Aldrich high-speed shake. This up-to-date Fourdrinier part was built by the Beloit Iron Works and incorporates the newest features in papermaking machinery.

When changing a wire the removable Fourdrinier rolls out by power as a unit. It eliminates the necessity of handling any parts, saves time, prevents wear and abuse of table rolls, etc. and maintains permanent and perfect alignment of running parts. It insures longer wire life and more efficient operation.

The shake is adjustable both as to stroke and speed while machine is in operation. It enables the operator to determine and conveniently



regulate the correct motion that will give the best results in the shortest time.

Other features of the Beloit-built Hammermill Fourdrinier part are the breast rolls and table rolls mounted in Timken bearings, savealls, under the wire, so arranged that they are easily cleaned and requiring no handling when changing wire; suction boxes with patented hydraulic oscillating device, which prevents grooving of covers and insures longer wire life and easier guiding of the wire; Beloit Cantilever suction couch roll with direct drive, permits suspending the front end of roll in the air, thus dispensing with the use of a "cigarette holder" when changing wires with the Beloit wire carriage.

The small amount of power required to operate this Fourdrinier is amazing indeed.

It will pay you to get the facts. Write us.

The Removable Way is the Modern Way

BELOIT IRON WORKS, BELOIT, WIS., U. S. A.

The **BELOIT**



When writing to BELOIT IRON WORKS please mention PACIFIC PULP AND PAPER INDUSTRY

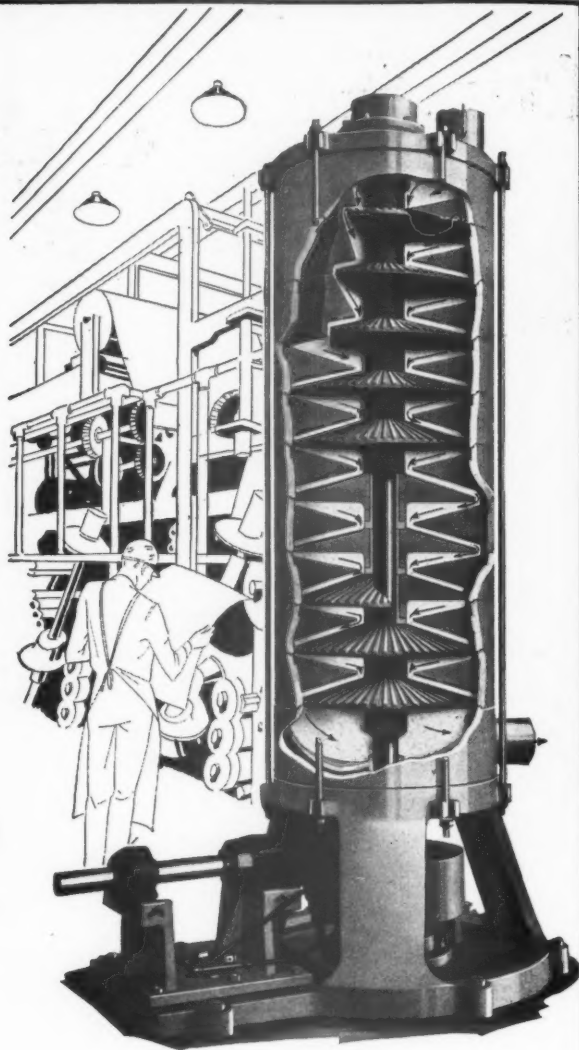
PAPER QUALITY *Starts Here*

Paper, it is said, is made in the beaters. The pulp that flows onto the Fourdrinier wire is paper in solution—it has received its character, its basic qualities for better or for worse, and is beginning its long journey through the world of business. The best the paper machine can do is to shake the water from it, dry it out, smooth it, roll it up.

If the length and strength of the fibres is preserved throughout the process that prepares them for nestling together on the Fourdrinier into a sheet of paper, the result is good paper.

It is the province of the Fritz Vertical Hydrator to prepare the pulp for the final process of paper formation better than it has heretofore been prepared. The fibres are scientifically hydrated and brushed out without recourse to beating, bruising, pounding.

Strength increase is a matter of record in all mills equipped with this machine. We invite correspondence.



The Hydrator consists of ten discs mounted on a vertical shaft and running opposite ten stationary discs mounted on the inside wall of a cylinder 3 feet 2 inches outside diameter. The movable discs have 59 tapering bars 9 inches long and the stationary plates have 52 similar bars. The discs travel at a speed of 300 R. P. M.

The clearance between the discs is adjustable from .003 inch to .030 inch.

Stock passes between the bars on the stationary plates and the whirling discs, is thrown to the outside by centrifugal force while being refined and hydrated; then the suction action draws it down to the next battery of stationary and movable elements, where it is similarly acted upon.

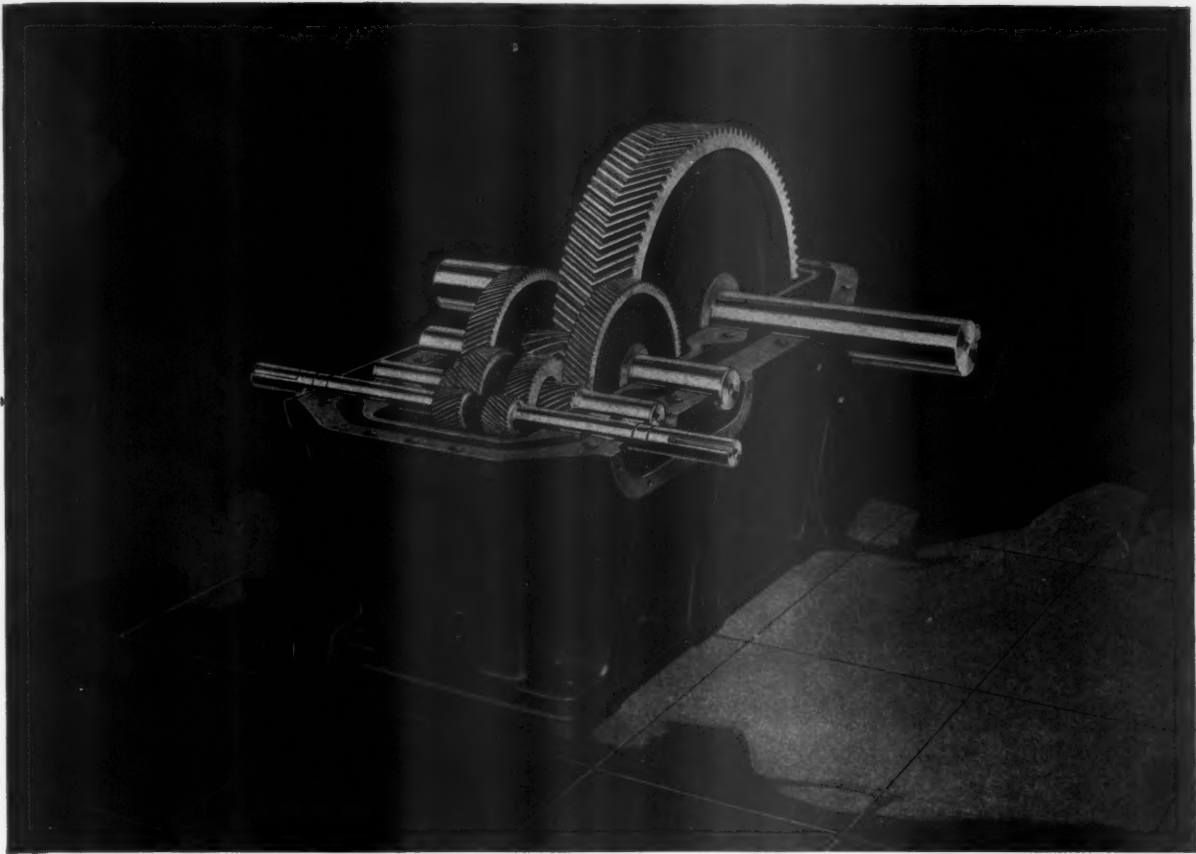
Fully covered by patents and patents pending in the U.S. and foreign countries

VERTICAL HYDRATOR COMPANY

Pulp and Paper Mill Machinery and Supplies

General Offices: Tribune Tower

CHICAGO, ILLINOIS



Falk Speed Reducers Insure Greater Efficiency — Have 100% Overload Capacity

FALK Speed Reducers Have "Built-In" Advantages

In their construction are found the reasons why Falk Speed Reducers operate quietly—why they are highly efficient . . . Symmetrical arrangement allows equal pressure on bearings and prevents uneven wear and misalignment . . . All wearing parts are interchangeable and renewable . . . Patented splash system of lubrication assures long, uninterrupted service . . . Excessive capacity makes it unnecessary to buy over-size reducers . . . There are no male or female shafts, bushed gears or overhung studs—nothing but plain bearings and live shafts . . . Naturally the highest possible efficiency is maintained throughout the life of reducers . . . For practically every kind of service, there is a Falk Herringbone Gear Speed Reducer—made in standard sizes and ratios, and carried in stock for immediate shipment.

The country-wide recognition and acceptance of Falk Herringbone Gear Speed Reducers is an earned one . . . It is the result of efficient, faultless speed reducer service based upon actual performance . . . Falk Speed Reducers incorporate the famous Falk Herringbone Gears, designed to deliver 96% to 98½% of the power at full load . . . They have 100% overload capacity for starting and during intermittent periods . . . Simple, compact in design, Falk Speed Reducers are oil-tight, dirt-proof, noiseless, free from heat and vibration . . . They permit a higher ratio of reduction per gear, transmit the load and transform speed with less friction loss than any other type . . . Standard sizes carried in stock at competitive prices . . . Send for a Speed Reducer Bulletin.

THE FALK CORPORATION—Milwaukee

NEW YORK	WILKES-BARRE	AKRON	CHICAGO	BIRMINGHAM	SEATTLE
ALBANY	PITTSBURGH	DETROIT	MINNEAPOLIS	HOUSTON	SAN FRANCISCO
ROCHESTER	CLEVELAND	KALAMAZOO	ST. LOUIS	DENVER	LOS ANGELES

Canada: The William Kennedy & Sons, Ltd., Owen Sound, Ontario,

Branches: HALIFAX TORONTO MONTREAL COBALT WINNIPEG VANCOUVER

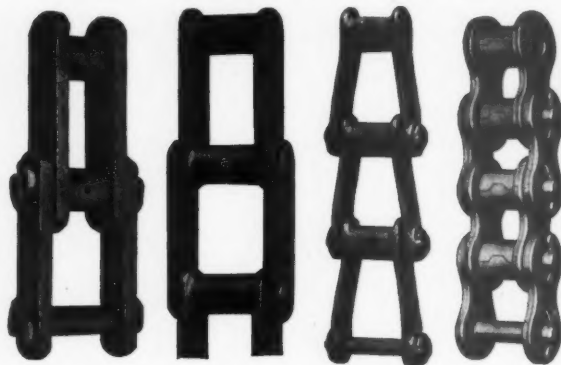
FALK

SPEED REDUCERS

When writing THE FALK CORP., please mention PACIFIC PULP AND PAPER INDUSTRY.



Peck Carrier



SS-850 Chain for suspending and operating barking drums

'C' Class Combination Chain

'400' Class Chain

'RC' Class Chain for power transmission



Belt Conveyor



>FLINT-RIM< Sprocket



'S' Spur attachment



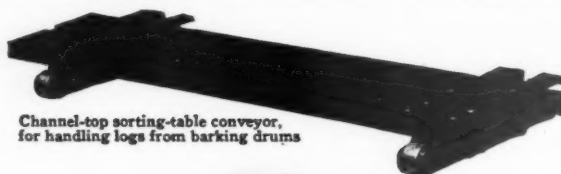
Plain Bearing



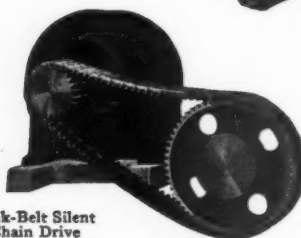
>HEXTOP< Grease Cup



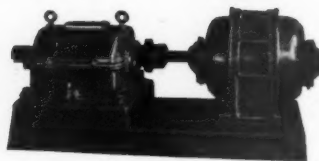
Link-Belt Crawler



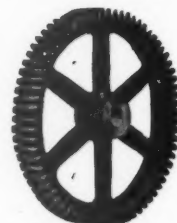
Channel-top sorting-table conveyor, for handling logs from barking drums



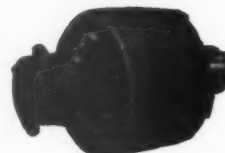
Link-Belt Silent Chain Drive



Link-Belt Herringbone Speed Reducer (Sykes tooth form)



Gears of all kinds



Friction Clutch



Malleable Iron Safety Collar



Style "DS" Take-up



Chain Conveyor handling logs

Everything for Handling Materials, and Driving Machinery

EVERY mill should use the new 1088-page Link-Belt General Pricelist Catalog 500, which completely covers in list prices and descriptions, the machinery equipment to keep the mill going. Address the nearest office listed below.

Leading Manufacturers of Elevating, Conveying, and Power Transmission Chains and Machinery
 CHICAGO, 300 W. Pershing Road INDIANAPOLIS, 200 S. Belmont Ave. PHILADELPHIA, 2045 W. Hunting Park Ave. 3436
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 San Francisco 19th and Harrison Sts. Seattle 820 First Ave. S. Portland, Ore. 67 Front St.
 Oakland 526 Third St. Los Angeles 361-369 S. Anderson St.

LINK-BELT



I wouldn't miss getting
this little book for anything



It comes to my desk every month and is loaded with timely information about things we ought to know. After I have read it, I pass it on down the line. If you are not getting it you're missing something. Better drop a line to Black-Clawson to put you on the mailing list, and it will be sent regularly without cost or obligation.

The
Messenger

Executives, engineers and department heads of paper and pulp mill plants will gladly be put on the Messenger mailing list gratis, upon request.

THE BLACK-CLAWSON COMPANY
HAMILTON, OHIO

Operating Shurtle Brothers Machine Co., Middletown, Ohio

EXPORT OFFICE: 15 PARK ROW, NEW YORK CITY

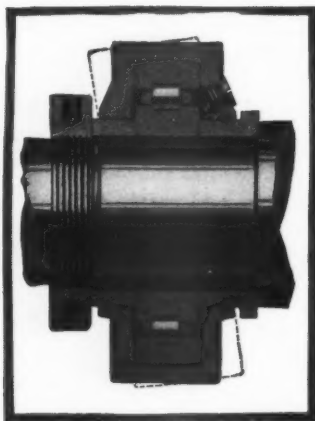
BLACK-CLAWSON

Built with Machine Tool Accuracy

A glimpse of the lower press roll assembly on a No. 5 cylinder machine in the Manayunk (Pa.) Mill of the Container Corporation of America.



WHERE
the load is Heaviest
and the duty Hardest!



FOR nearly three years, without any trouble whatever, NORMA-HOFFMANN Precision Roller Bearings have carried the exceptional load of the lower press rolls on this cylinder machine.

The duty is extremely heavy. Added to the weight of the lower roll (carried entirely on the bearings) is the weight of the upper roll plus the pressure exerted by a hand-screw. But even under this tremendous burden, PRECISION Quality is demonstrating the superdependability for which it has always stood.

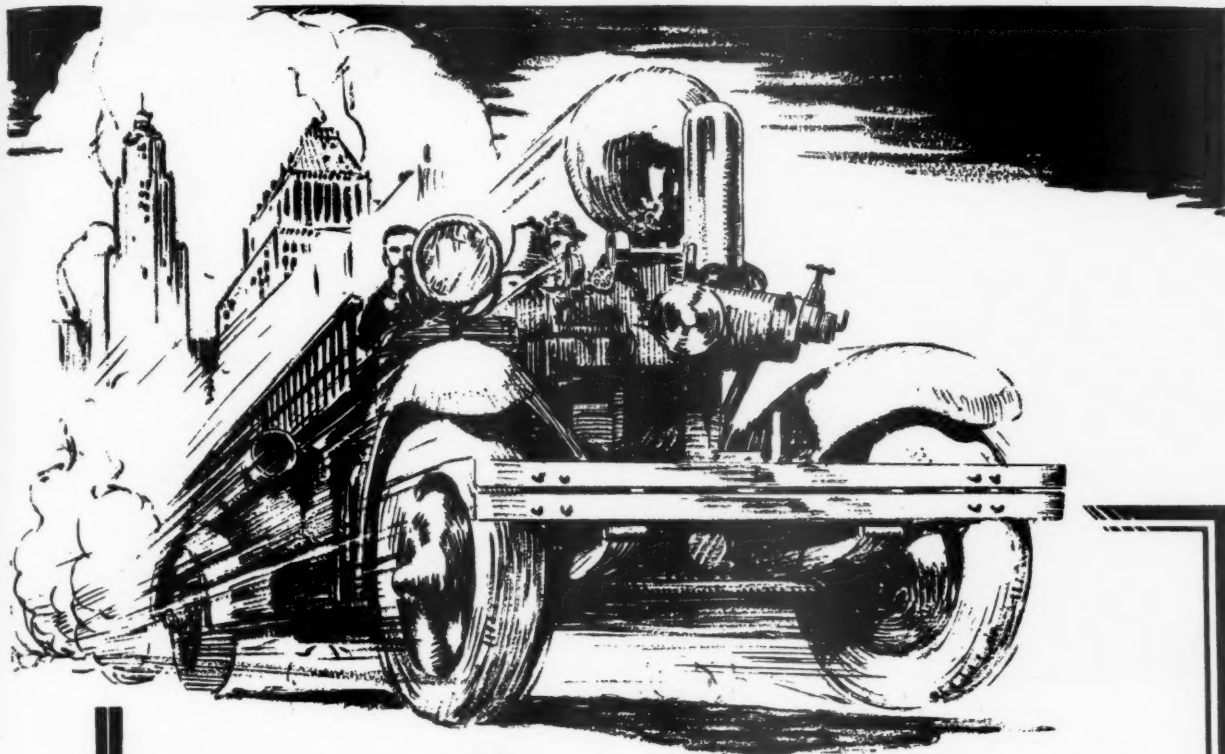
Let our engineers share with you their long experience in applying Precision Bearings to paper mill problems.

NORMA-HOFFMANN
PRECISION BEARINGS

NORMA-HOFFMANN BEARINGS CORPORATION STAMFORD, CONN., U.S.A.

N-1054

When writing to NORMA-HOFFMANN BEARING CORP., please mention PACIFIC PULP AND PAPER INDUSTRY



In an Emergency it's SERVICE

*And here's
the Shartle
Brand*

—The Howard Smith Paper Company, Montreal, needed a pump and had to have it quick. They wired the order at 4:45 p. m. and the pump was on its way at 11:00 a. m. the next morning.

*Here's
Another*

—The Cornstalk Products Co. needed three thickeners in a hurry. Six days after the order came in the thickeners went out—and that's speed on a product like thickeners.

*And One
More*

—May 27th, U. S. Gypsum Co., reported "shut down, broken breaker roll." In just 91 hours, less than 4 days, we had built from the ground up a complete set of our latest type marine bearings and housings, new armor plate, steel sides and hood and had started it on its way.

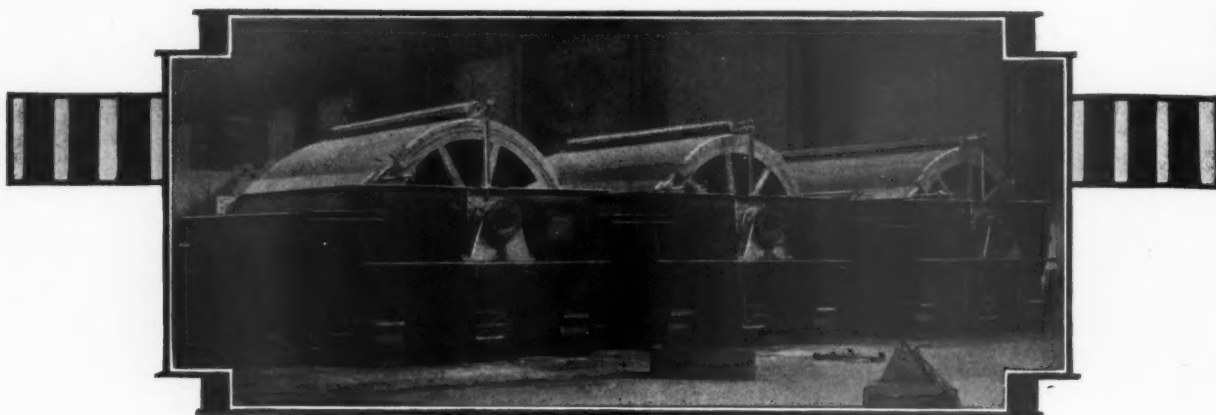
Here at Shartles it is all in the day's job to receive emergency calls and handle them with dispatch. You might bear this in mind when you get into a tight place where time is money.

SHARTLE BROTHERS MACHINE CO.
MIDDLETOWN, OHIO
Export Office, 15 Park Row, New York City

SHARTLE BROTHERS

DIVISION OF THE BLACK-CLAWSON COMPANY





More Efficient Deckers Mean Better Paper

THERE is something almost uncanny in the way the stock coming from Oliver United Deckers hardly varies from the predetermined consistency.

Even fairly wide fluctuations in the stock feed have little effect and can be handled in a most satisfactory manner.

This uniform consistency means better control in the stock chest. There is greater assurance of a

uniform product.

And in addition the fine fibers, which escape through the ordinary decker, are retained in the stock. They, too, help to produce a better product.

Well over a hundred and fifty Oliver United Deckers are now in service. They have provided better deckering. They have aided in improving the manufacturing as a whole.



OLIVER UNITED FILTERS INC.

SAN FRANCISCO
Federal Reserve Bank Bldg.

LONDON, W. C. 1
150 Southampton Row

Johannesburg, E. L. Bateman
Honolulu, W. A. Ramsay Co.
Halle, Germany, Wilhelm Lill
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NEW YORK
33 West 42nd St.

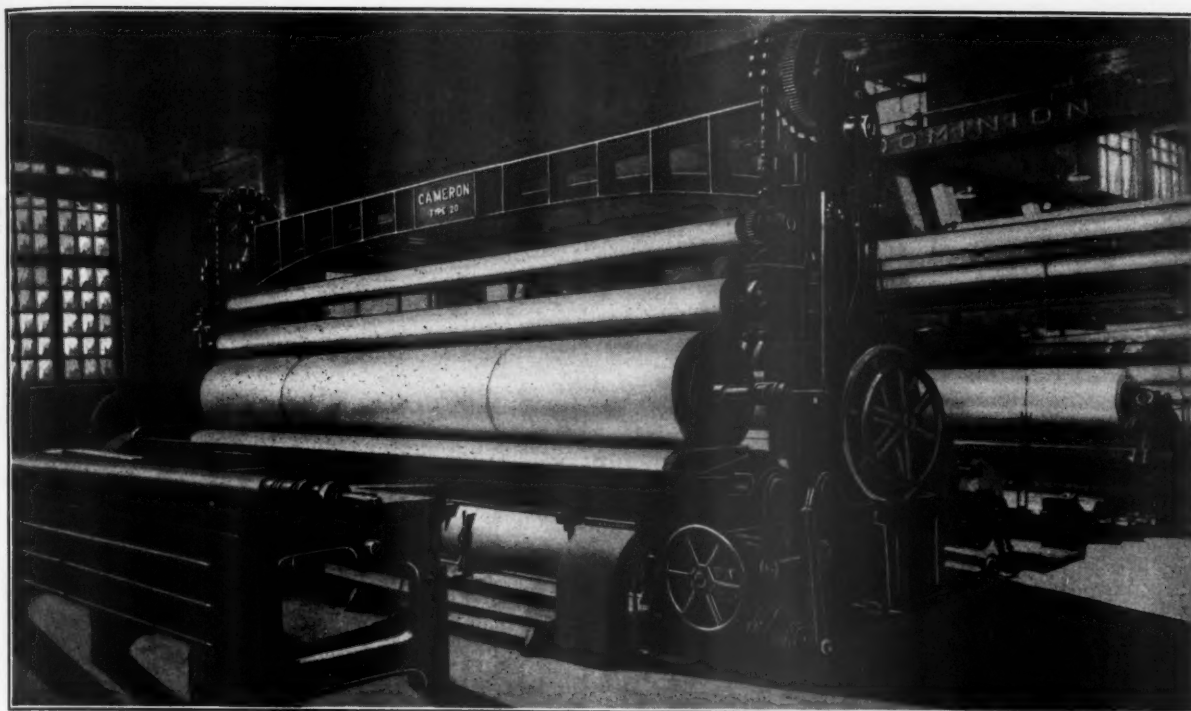
PARIS
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Factories: Oakland, Calif.; Hazleton, Penna.
Cable Address: OLIUNIFILT



WHEN THE PAPER PILES UP ON THE REELS

does your winder keep the aisles clear of rolls?
CAMACHINES are built in speeds up to 3,000
feet per minute. Fast enough to keep well ahead
of the fastest paper machine and wind perfect
counter bag and shipping rolls.

Would you like to have additional interesting in-
formation on these modern high speed winders?



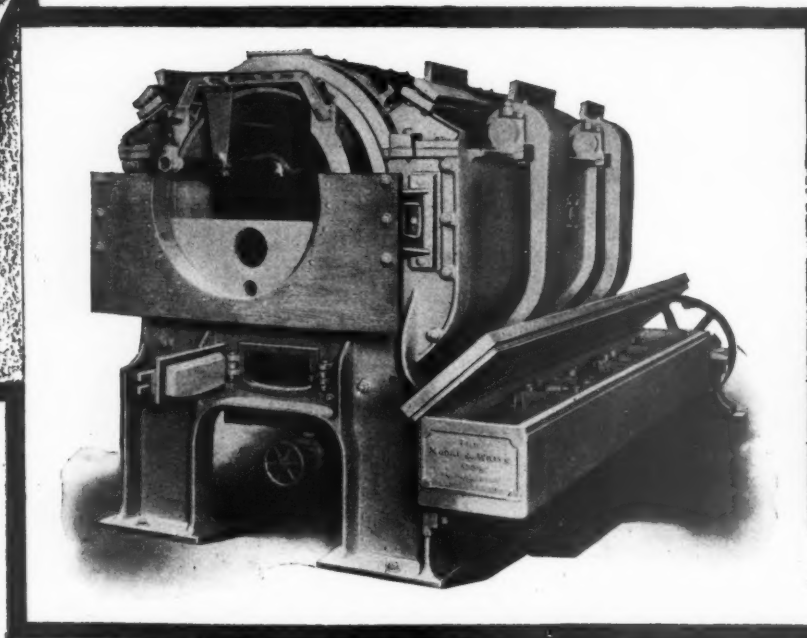
CAMERON MACHINE COMPANY

61 Poplar Street, Brooklyn, New York

When writing CAMERON MACHINE Co., please mention PACIFIC PULP AND PAPER INDUSTRY.

M&W ROTARY SCREEN

FOR FOURDRINIER AND CYLINDER PAPER MACHINES



Clean—"and No Maybe"

There's no "maybe" about the cleanness of a freshly-washed "M & W" Rotary Flat-Plate Screen. Notice the large opening of the cylinder necks. Everything inside is visible. To wash up, doors at the ends of the vat are opened, and a hose is played inside. That's all. Using an electric bulb, the whole interior may be inspected. There's no guessing. Two minutes with a hose is ample. If a different grade of stock is to be run, one hour covers changing plates.

Paper mill executives seeking the cleanest paper at the lowest screening cost will find many other interesting features in "M & W" Rotary Flat-Plate Screens.

A catalog fully describing them will be sent on request.

THE MOORE & WHITE CO.,

NORTH PHILA. STATION
PHILADELPHIA, PA.

P A P E R . M A C H I N E . B U I L D E R S

When writing to THE MOORE & WHITE CO., please mention PACIFIC PULP AND PAPER INDUSTRY.



Imagine the Savings!

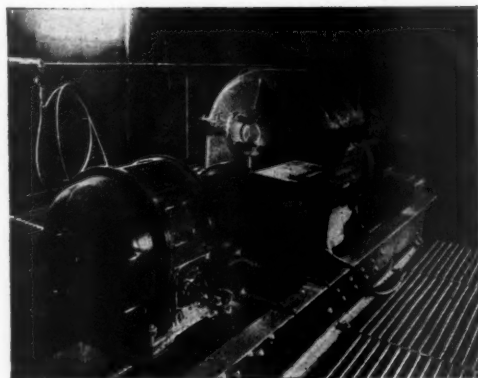
IMAGINE what a difference it would make in the efficiency and economy of the machine drives in some industrial plants if the gearing were as well selected and maintained as the gearing on the turbines in the power plant. Often, the geared drives used with production equipment seem to have been selected with regard only to the attainment of the correct machine speed. Economy of operation and maintenance are too often neglected.

Of course, the production departments of plants where such poor practice is found will argue that suitable gearing costs too much. The idea will be advanced that it is better to endure losses in power and high cost of maintenance than to run up the fixed charges by being too particular about the gears. This view, however, takes no account of the losses in production volume that follow the use of misapplied, unsuitable, but cheap gearing.

When the management of plants now permitting such wasteful practices realizes the waste that is going on, changes will be made. The selection and maintenance of gearing in the production department will be put in charge of the power engineer, who by training and experience is fitted to carry out the most economical procedure. And when this step is taken, imagine the savings that will be made!

Editorial
from Power

Turn Imagination into Reality



WESTINGHOUSE-NUTTALL gear units are not merely a more compact method of reducing speed—their higher efficiency and more lasting dependability minimize those costly losses in production volume, and in power. Because they are totally enclosed in oil-tight and dust-proof cases, they require no attention except occasional oiling. What an obvious saving all this means over the often misapplied, exposed drives!

Westinghouse-Nuttall gear units, the outcome of forty years of scientific development, serve the industry through unmatched quality.

Our nearest representative will gladly show you how to turn imaginary savings into reality.

WESTINGHOUSE ELECTRIC & MFG. COMPANY
NUTTALL WORKS
CANADIAN AGENTS: LYMAN TUBE AND SUPPLY COMPANY



Westinghouse

T 30487

Industrial Apparatus includes - -

Arc Welding Equipment
Automatic Switching
Babbitt and Babbitt Pots
Circuit-Breakers
Electric Locomotives
Electric Ovens
Instruments and Meters

Insulating Materials
Lighting Equipment
Mazda Lamps
Micarta Gears
Motors and Control
Panelboards

Porcelain Insulators
Safety Switches
Stokers
Transformers and Lightning
Arresters
Speed Reducers

When writing WESTINGHOUSE ELECTRIC & MFG. Co., please mention PACIFIC PULP AND PAPER INDUSTRY

WASTE! WASTE! WASTE!

WHY... Do you take a chance with your wire and felts?

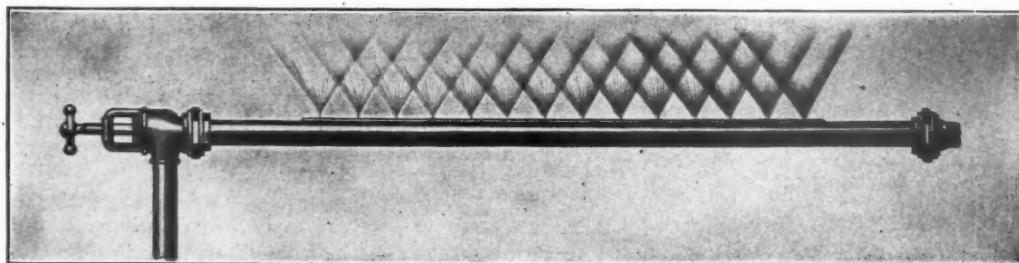
WHY... Do you wash the dirt onto your clothing?

WHY... Do you waste power pumping water for showers?

WHY... Do you wish the stock would not stick?

WHY... Do you not use the hi efficiency "RAINSTORM" shower pipe?

BECAUSE you are not familiar with
THE "RAINSTORM" SHOWER PIPE



The Shower Pipe which does the work with 2/3 the pressure and does it right.

DON'T TAKE A CHANCE!

with loose pieces—sharp projections—from dirt discharge on the wire

Get familiar with the "RAINSTORM" shower for your paper machine

MANUFACTURED BY

THE SMITH & WINCHESTER MFG. CO.

SOUTH WINDHAM, CONNECTICUT

Western Sales Agent: JAY PLATT HAMERSLAG, 655 Russ Building
San Francisco, California

When writing to SMITH & WINCHESTER MFG. Co. please mention PACIFIC PULP AND PAPER INDUSTRY

HOOKER Chemicals

Every product, every process has originated in or passed thru our Research Department. We are justly proud of this painstaking care in development and production. It guarantees you Hooker Chemicals of the Highest Quality.

With plants conveniently located and our policy of carrying ample stocks of materials on hand at all times, we are prepared to make prompt and efficient deliveries to all sections of the country.

*of the
Highest
Quality*

—
**HOOKER
CHEMICALS**

Caustic Soda
Liquid Chlorine
Bleaching Powder
Muriatic Acid
Monochlorobenzene
Paradichlorobenzene
Benzoate of Soda
Benzoic Acid
Benzoyl Chloride
Benzyl Alcohol
Antimony Trichloride
Ferric Chloride
Sulphur Monochloride
Sulphur Dichloride
Sulphuryl Chloride
Salt

HOOKER ELECTROCHEMICAL COMPANY

WESTERN
Sales Office:
TACOMA, WASH.
Plant: TACOMA, WASH.



EASTERN
Sales Office:
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Plant: NIAGARA FALLS, N.Y.



Part of an order of 72 5-h.p., 750 r.p.m. type "AR" Motors direct connected to Sturtevant Convertible Multivane Fans for installation in a large rayon plant.

All Fan Bearings are Eliminated in this Unique Motor Installation

IT WAS possible to entirely eliminate the fan bearings in building these convertible multivane fan units for the air conditioning system of a large rayon plant. Because of the rugged construction, high mechanical efficiency and short shafts of the Allis-Chalmers motors, the rotating elements of the fans were mounted directly on the motor shaft extensions. This resulted in a more silent and efficient as well as a more compact unit. From the opposite ends of the motors, Texrope Drives operate other parts of the equipment.

The sturdy mechanical construction of Allis-Chalmers motors is emphasized in the frames, shafts and bearings. Electric steel frames and spiders give maximum strength with minimum weight. Compactness in design permits shorter and more rigid shafts. These features, together with the greater load area and thrust capacity of the bearings, make these motors peculiarly adaptable to direct drives.

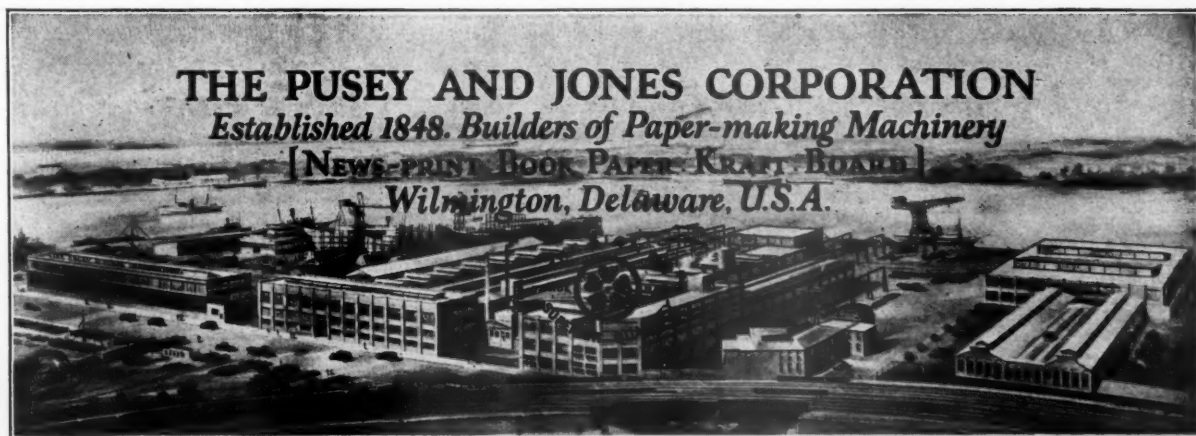
ALLIS-CHALMERS MANUFACTURING COMPANY, MILWAUKEE, WIS.

ALLIS-CHALMERS MOTORS

When writing to ALLIS-CHALMERS MFG. CO. please mention PACIFIC PULP & PAPER INDUSTRY



To jack up production, without increased payroll, you can't do better than to install Pusey and Jones Paper-making Machines. The answer to bigger volume—in output, sales, collections and deposits, the added feet delivered like clockwork, hour after hour.



THE PUSEY AND JONES CORPORATION

Established 1848. Builders of Paper-making Machinery

[NEWS-PRINT BOOK PAPER KRAFT BOARD]

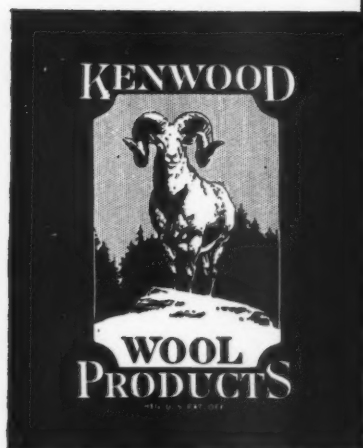
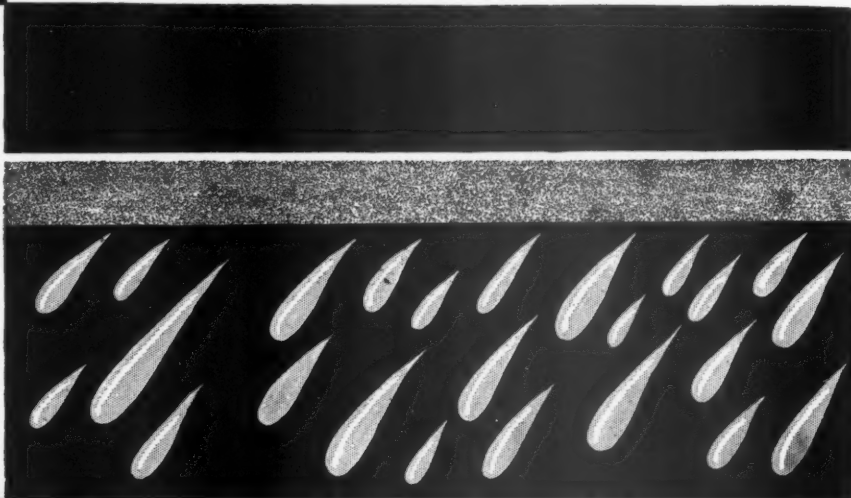
Wilmington, Delaware, U.S.A.

When writing to PUSEY & JONES CORPORATION please mention PACIFIC PULP AND PAPER INDUSTRY



Assuming average water removal properties, length of life and smoothness in running as being 100%, the operations chart of the New Kenwood Tanned Board Felts shows a decided upward curve.

THE NEW KENWOOD TANNED BOARD FELTS SHOW A DEFINITE UP- TREND IN PRODUCTION ECONOMY



Progressive, scientific development in Kenwood Felts has produced such outstanding successes as the One Sided Board Felt (pioneered by Kenwood), the Kenwood Tanning Processes (developed by Kenwood), and now, the NEW Kenwood Tanned Bottom, Top and Press Felts.

Through a new method of yarn construction that does not increase weight or bulk in the felt, four definite improvements are achieved. These NEW Kenwood Felts are stronger, longer lived, more open and possess a better surface.

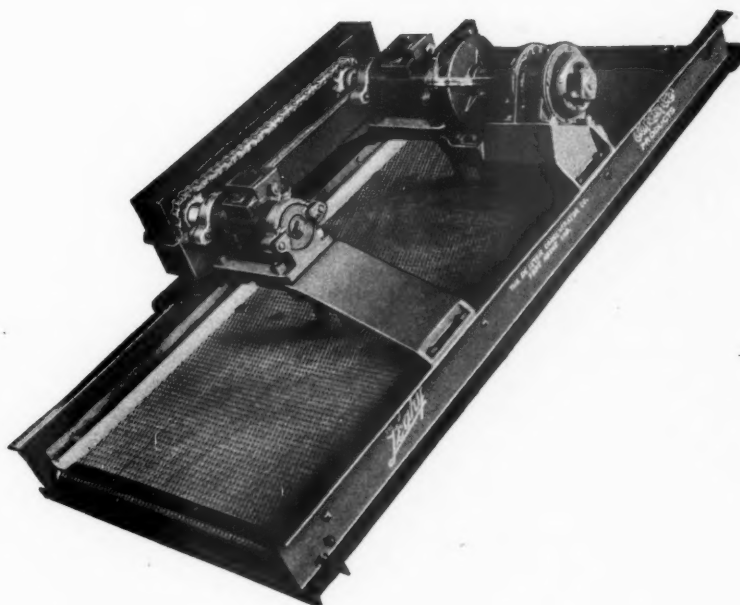
F. C. HUYCK & SONS

KENWOOD MILLS, ALBANY, NEW YORK

KENWOOD MILLS LTD., ARNPRIOR, ONTARIO, CANADA

KENWOOD FELTS

When writing to F. C. HUYCK & SONS please mention PACIFIC PULP AND PAPER INDUSTRY



WHERE SCREENING IS DIFFICULT *Leahy* EMPLOYS A DOUBLE VIBRATOR

On jobs where the material being screened is separated with difficulty, the LEAHY employs an extra long screen jacket assembly and a double vibrator. The two vibrators acting in unison insure vibration to the very ends of the long screen surface. This type of vibrating screen is very efficient in the sorting of damp or wet wood chips from clinging sawdust and slivers.

The principles of the LEAHY NO-BLIND Screen are protected fundamentally by Reissue Patent No. 16,701, reissued August 9th, 1927.

*For Complete Information on the Leahy
Screen or on Your Conveying Problems, write*

WEBSTER-BRINKLEY CO.

SEATTLE, WASHINGTON

Manufacturers and Engineers of Conveying, Screening, Elevating and Transmission Machinery

When writing WEBSTER BRINKLEY CO., please mention PACIFIC PULP AND PAPER INDUSTRY

Product is Improved —Costs are Improved

What the Marcy Open End Rod Mill brings to the paper maker

NO paper manufacturer is going to pass up—at least not without consideration — ways and means of improving his finished product.

But if in addition to improving the product, he can at the same time cut costs, the investment in the "ways and means" is all the sounder.

If asked, several prominent operators would say they use the Marcy Open End Rod Mill with excellent results. In one plant, the caliper of the board was made more uniform because the fibers were more uniform and also machine broke was greatly reduced. In another plant, the strength of the paper was materially increased. The formation is better. In all plants using Marcy Rod Mills, per ton costs for beating are very low.

Marcy Open End Rod Mills are a sound investment for paper manufacturers.

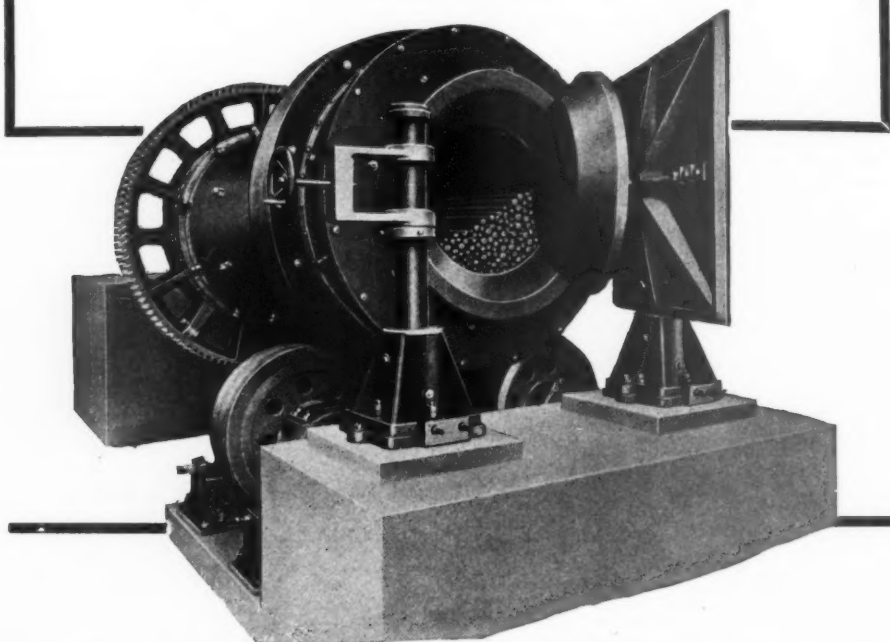
The **MINE and SMELTER**
SUPPLY COMPANY

DENVER

NEW YORK, 225 Broadway

Lisensee under the Marcy Rod Mill Patents

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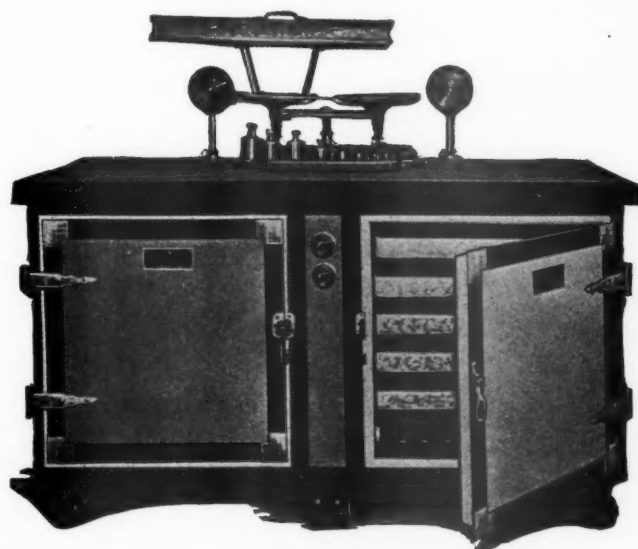


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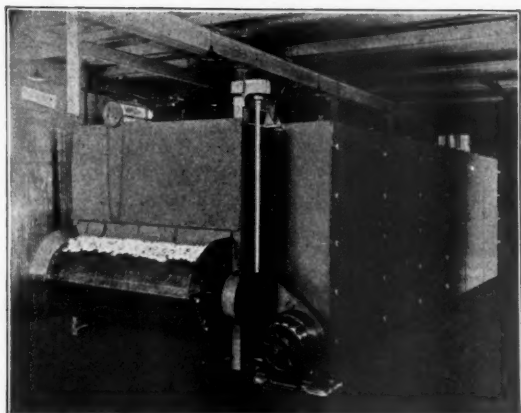
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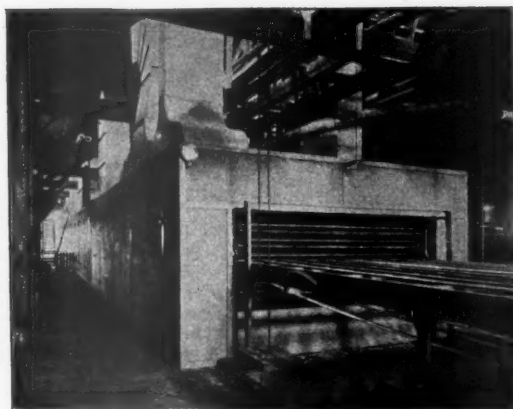
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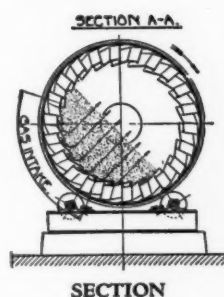
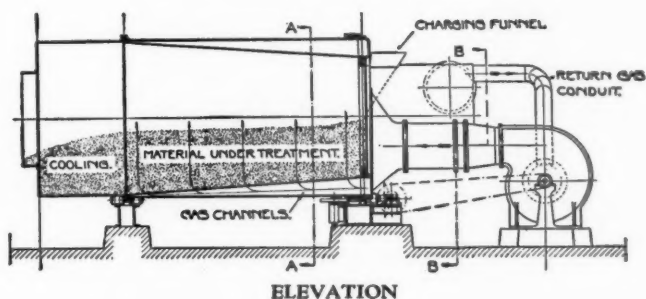
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DECEMBER, 1929

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EDITORIAL

¶ The problem of sawmill and woods waste stands in a fair way to solve itself if we may judge by current trends. There is already a noticeable tightening of hogged fuel supply. Many sawmills now have allied chipping plants. One insulating board mill now under construction will draw heavily upon waste in a few months. Another big insulating board mill is said to be now considering the Coast for a site. It, too, will help toward more effective utilization.

¶ There is an increasing demand for insulating materials. Many of the companies now making products of this class have had somewhat phenomenal growth. The possible markets have perhaps not been tapped. Growth of the mechanical refrigeration industry makes new demands for insulating materials. Just this month one big refrigerator company made a significant change from cork to wood fibre insulation.

¶ If wood becomes too valuable to burn it will mean an increasing amount of attention to steam economy and a trend toward firing oil and coal. Steam economy, in its real meaning, is as yet an unknown subject in the Pacific Northwest wood-using industries.

¶ The year closes with a rosy outlook for the Pacific Coast. Big things are forecast in the way of new and better construction. Business is good. It is our wish that all may participate in

¶ A PROSPEROUS NEW YEAR.

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AND DISTRIBUTORS OF PULP, PAPER, AND BOARD.**

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Sitka Spruce -

A noble tree lends its name to the

Pacific Coast's Newest Pulp Mill

IN the vast coastal empire contained in the 300 odd miles stretching along the rugged Oregon coast from the mouth of the Columbia River to the California state line and reaching inland some 50 miles to the low summits of the Coast range the hand of man has little more than scratched at nature's resources.

As for logging and lumbering in this region there is nothing new to report, for there have been logging camps and lumber mills drawing here and there upon the timber for several decades. But as for pulp the region has been entirely overlooked in the five or six years just passed which have marked such an active expansion of pulp and paper manufacturing on the Pacific Coast.

In some respects it may be said that pulp development of this region has not been able to offer perhaps quite the same facilities that may have been more readily accessible in some other regions. Coos Bay, somewhat more than halfway down the Oregon Coast, has more harbor improvements than other potential ports in this stretch of Coast. In fact, the claim is made that Coos Bay is the only natural port between the mouth of the Columbia and San Francisco.

As for railroads, these are still few. The country is still very new. The Southern Pacific now terminates the rails of a branch line on Coos Bay, a line reaching southwesterly to the Coast from the main line at Eugene, Oregon. This branch has only been in for the past 13 years. But Coos Bay people look to better times, to a deeper harbor, to more railroads, to more industries. The country is still very new.

A New Industry

Last month a new industry made its bow in the Coos Bay region when the Sitka Spruce Pulp & Paper Co. made its first cook of pulp on November 23.

In many respects this new mill has points of interest, opening up as it does this vast timber country of the Oregon Coast to pulp and paper manufacture. Somewhat more than a year ago C. McC. Johnson with associates began construction on a mill that had been sifted mentally for many preceding months. Mr. Johnson has been knocking about in the Oregon Coast country, identified with logging and sawmilling, for at least a quarter century. When he announced the formation of a company to be known as the Sitka Spruce Pulp & Paper Co., to construct a 50-ton sulphite pulp mill at Empire, on Coos Bay, he had in mind the construction of a plant that would combine sawmill and pulp mill and which would use Sitka spruce almost exclusively.

Mr. Johnson has little to say about the company of which he is president. Suffice it to say that this organization includes Nonda Anderson, another veteran Coos Bay lumberman, and others, and that the company is entirely financed from within around a group of Oregon timbermen. The whole project has moved along very quietly. But the mill is there today, and operating. That is proof of the pudding.

The Sitka Spruce Pulp & Paper Co. is divided into two main units which are complementary. These are a sawmill and a pulp mill. The basic idea is to effect a greater wood utilization than would be possible perhaps than with either unit operating alone. The sawmill will saw out the clears and turn over the balance of the log



PRESIDENT C. McC. JOHNSON
Out around the plant in a slicker

to be divided between saws and digesters according to the dictates of the lumber and pulp markets, respectively effecting a balance that will derive the greatest cash turn from the individual tree. Mr. Johnson estimates that the Sitka Spruce holdings which back this mill run about 95 per cent spruce. There will also be some fir and some white fir and hemlock, but the pulp mill will get Sitka spruce almost exclusively.

The mill is located on low land near the sea entrance of Coos Bay harbor about one mile out of the new community of Empire and four or five miles out of North Bend and its neighbor city of Marshfield.

A dock runs in a long arc out from saw and pulp mill to deep water where the largest ships capable of negotiating the harbor's present 21-foot depth can be accommodated. A spur of the Southern Pacific also serves the mill's two units. There are no nearby industries to contribute smoke and dirt.

The sawmill extends out over the more shallow water where it can draw conveniently from the log booms. This unit has a capacity of 130,000 board feet per 8-hour shift. The whole plant forms somewhat a letter "Y" as can be observed from referring to the aerial view shown on the cover of this issue.

All of the log except the clears passes along a steel

chain conveyor to a wood room where the better pieces are selected for pulp and the balance of the material goes through a hog for boiler fuel. The combined plant has its own boiler house which supplies all the steam requirements, but electric power is supplied by a public utility company.

Accepted pulpwood is barked, if necessary, on Hesse-Ersted concave head barkers and dropped to a conveyor chain leading to a new type Hesse-Ersted chipper. All chips then pass to a W. S. Tyler Co. "Hummer" double deck chip screen. Rejects go through a chip breaker and back to the screen and the sawdust goes directly out by conveyors to the boilers.

Accepted chips are carried by steel chain conveyor to chip storage at the top of the digester house.

It might be mentioned at this point that all of the buildings are of exceptionally sturdy mill construction, with the exception of those buildings having to do with the acid plant, which are necessarily of concrete fire-proof construction. With the exception of the wood room all of the pulp mill buildings have concrete floors and footings.

the dirt as commonly happens when the usual cast iron targets are employed. Patents are being sought on this new target.

Turn here for a moment to the acid system which is the usual G. D. Jenson two-tower layout. There is a sulphur storage room and a sulphur burner room with a Glens Falls Machine Works burner. In the sulphur melting tank a system of steam jacketing has been developed in order to eliminate the usual steam coils which ordinarily clutter up the inside of the tank and make cleaning difficult. With this method the sulphur tank is a smooth vessel. Steam at about 100 pounds is introduced in the jacket and is found very satisfactory in melting the sulphur. Patents are being sought on this idea also.

Pulp screens and machine are housed in the same room. The pulp, after going through a mixing box, passes over two Wells undulating knot screens, over four sections of riffles and then to a bank of five flat screens which were designed by Mr. J. B. Wilt. These screens are fitted with plates from the Union Screen Plate Co. of Fitchburg, Mass. The fifth line is used for tailings



Looking across the flat screens down the length of the machine room.

There are two Willamette digesters 16 feet in diameter by 51 feet high and having a capacity of about 13 tons per cook. They were lined by the Stebbins Engineering Co.

The digesters discharge to two blowpits 26 feet in diameter by 24 feet high with suitable vomit stacks, and there is a third pit of the same size for stock storage which can, when deemed feasible to enlarge capacity, be easily converted into a third blowpit.

In connection with the blow pits a method has been worked out of circulating the liquor back to the top of the blowpit for the first half hour or so that the digester is discharging. The idea here is to save the fibre that would run off with the first flush of the liquor. As the liquor is drained off and the raw pulp mats itself into its own filter at the bottom of the blowpit, thereby saving further fibre loss, the circulation is stopped. Patents are being sought on this idea.

The blowpits have a new type target made up of blocks of wood held in place with keys of hardwood. There are no metal rods or spikes used in the targets, thus eliminating a source of discoloration. The blocks are set end grain exposed so as to minimize wear and are substantial in construction. Further, wood construction is more resilient. Thus there is less tendency to break up

and flows in reverse to the other four lines. Storage is provided for tailings after passing them through an Appleton screening refiner, and it is proposed to run these over the dry machine about once a week.

The flat screens have some novel features in the cam shaft which were designed by Mr. Wilt. On each cam there rides a steel roller with a tire of canvas fabric. The rollers and cam shaft are equipped with roller bearings. The bearings are oiled with bottle oilers and the entire layout is such as to make for cleanliness and extremely quiet operation. Patents on the canvas covered rollers and roller type bearings are being sought by the designer.

The machine is a Black-Clawson which formerly saw service in an Eastern mill. It has 42 dryers and trims 96 inches. There are two cylinders and three presses and two suction boxes, some modernizing of the machine having been accomplished at the mill. Instead of the usual pit installation the machine has been raised from the floor on legs about five feet high and this arrangement gives plenty of clear space beneath the dryers.

A ventilating equipment installed with the machine is designed to condition the air and dissipate the condensate with heated air so that it may escape without drip to the outer air. With this system the dryers are

run at low temperatures thus preserving the strength of the fibre.

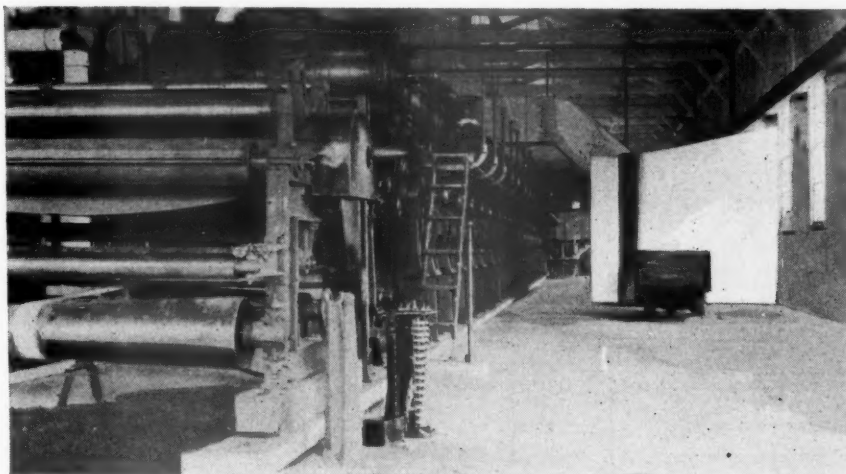
The machine is shaft driven with a General Electric steam turbine mounted on a gallery near the dry end. This turbine operates on 215 pounds of steam, diverting the exhaust to process drying, and turns 1200 r. p. m., delivering 100 h.p. through a Falk reduction gear.

The pulp is taken off in sheets and cut to convenient size and compressed into bales under a 600-ton hydraulic

Mr. Bellew was formerly with the Kimberly Clark Co. of Wisconsin and later with L. A. DeGuere, pulp and paper mill engineer who has built a number of mills in Wisconsin and on the Pacific Coast. He will be chemical engineer now that the mill is in operation, but it was between he and Mr. Wilt that the pulp mill part of the company was planned, and built, and now will be operated.

Other members of the staff at present include W. J.

A view from the finishing and storage room showing the machine from the dry end.



press. The bales are strapped with flat steel tape welded with an Acme electric spot welder.

The Worthington Pump & Machinery Corporation supplied nine different pumps for the new Sitka Spruce mill. On the fresh water system there is a 6-inch and a 5-inch unit, both fitted with ball bearings. For handling pulp there is an 8-inch and a 6-inch unit, both fitted with sleeve bearings. For handling white water there is one 8-inch ball bearing pump and two smaller pumps, 2½ inches and 5 inches, also with ball bearings. The seventh and eighth pumps of this list are used for acid and salt water circulation, respectively, and both are 5-inch units, and equipped with ball bearings. The acid pump is all bronze.

The Worthington pumps are going strongly to ball bearings, and those used are SKF. Worthington advances two main reasons for this trend. In the case of centrifugal pumps the friction element is minor, but the ball bearings require no attention and, being standard, they are found in stock practically everywhere, a point decidedly advantageous for any mill where lost production is a serious matter. The second main point is that the use of ball bearings makes the pump shaft more rigid and is conducive to longer life of the pump.

The mill is securing its water supply from a series of streams with small dams, the water being delivered to the mill in wood pipe. The water is treated at the mill with equipment installed by the California Filter Co. This equipment consists of a mixing tank, two settling basins, four filters and a clear well, the latter extending under the four filter units. The water supply is also hooked up to the fire and all mill supplies.

The two men who have designed and erected the pulp mill are J. B. Wilt and E. T. Bellew. The former has been in the sulphite game in the East for a quarter of a century and also has been connected with a number of Pacific Coast mills. He holds the title of sulphite superintendent.

Wilt, son of J. B. Wilt, a young fellow who has rather "grown up in" the pulp mill business. He is handy in both the office and in the mill and will be the other half of a "father and son" team.

J. G. Parsons will be a shift foreman. He came to the Coast from West Virginia, having known Mr. Wilt when both were back there.

A. A. Salmen, who has been connected with a number of Pacific Coast sulphite mills, will also be a shift foreman.

C. W. Parker, who has been associated with President Johnson for a number of years, will continue actively with the saw mill in an executive capacity and will also handle pulp sales.

James Lyons is in charge of saw mill production.

Robert Dutton is in charge of the office end of the saw mill.

This Month's Cover

The aerial view shown on the cover this month was taken shortly before the new sulphite mill of the Sitka Spruce Pulp & Paper Co. at Empire, Oregon, was completed. Reference to the story published will serve better to identify the main features of the mill, but for he who reads and runs, the following is offered.

Extending out into deep water is the big dock which is used both for incoming materials and outgoing pulp and lumber. It is served with standard gauge rails. Coming inshore one sees the log booms almost completely surrounding the saw mill unit, the latter being built on piles out over the shallow tidewater. In the broad angle between the two main lines of buildings and adjoining the saw mill can be seen the lumber dock where sorting is done as lumber comes off the green chain.

A relatively short gap is noted between the sawmill and the wood room, the latter being partly obscured by

the greater height of the digester house. The digester building is readily identified since it is the highest part of the plant, with the exception of the Jenssen acid towers immediately to the right.

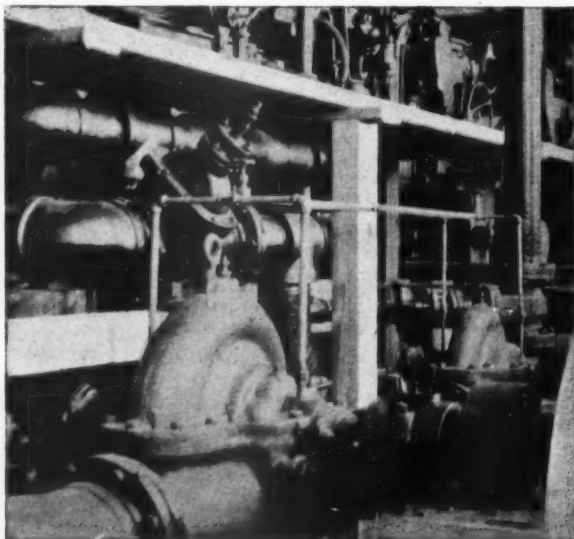


J. B. WILT
Superintendent
of the
sulphite mill.

In the shadow of the acid towers is the boiler plant and extending inshore from it is the trestle supporting a conveyor used for hogged fuel storage. The boilers, it will be noted, are adjacent to the wood room. All waste from the sawmill passes through this wood room to be converted either to chips or hogged fuel.

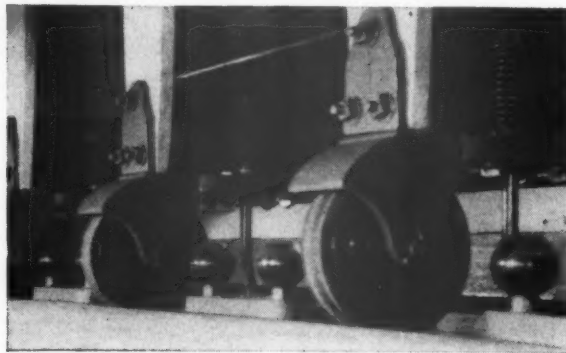
Paralleling the hogged fuel storage pile are the several units of the acid plant, including sulphur storage, burner room, cooling coils and acid room. The circular structures in this vicinity are units of the water filtration and storage system.

It will be noted that the entire group of buildings form a letter "Y". The third leg of this "Y", extending toward the lower left hand corner of the view, contains the pulp making units of the mill. Adjoining the digester house and still shrouded in construction scaffolding are the blow pits with vomit stacks and auxiliary tanks. The higher portion of the long building houses the screen room and the long low portion houses the drying machine. That part of the building lying at right angles to this long room at the left of the picture is the finishing and storage room.



These two Worthington pumps are used for white water

Appropriately lending background to the name of the mill, the trees in the lower foreground are predominantly Sitka spruce, some of them being seven feet or more in diameter.



A close-up of the fabric-tired rollers designed by J. B. Wilt to effect more efficient and quiet action on the flat screens.

International Will Build Another Chipping Plant

The International Wood & Sulphite Co. is beginning construction immediately on another chipping unit, their fifteenth. The latest addition to the string will be erected adjoining the sawmill of the Clark-Nickerson Lumber Co., Everett, Wash., and will begin production in about three months.

The general plan of the unit will follow closely the design used in other divisions of the International chain, a design which by now has become somewhat standardized. The chipping unit will take sawmill refuse from the burner conveyor. There will be a battery of barkers to clean such material as requires that operation and clean wood will be worked up in three chippers, a crusher and refined over a battery of eight screens.

The plant will have a capacity of 200 units of chips per 8-hour day and its product will serve various mills in Puget Sound territory.

This is the second chipping unit to be built by the International Wood & Sulphite Co. at Everett. Another was recently completed on a site adjoining the Canyon Lumber Co. and is now producing.

In connection with the Clark-Nickerson plant it is interesting to note a trend here in milling hemlock. The Clark-Nickerson sawmill is a double one, one side of which is now to be entirely remodeled and equipped with Swedish gang saws in order to obtain more efficient production of lumber from the small size hemlock logs.

This revamping takes into consideration a noticeable trend in the log market. Not only has the percentage of hemlock increased from 5% to 30% of the total log production, but the general size of the logs is smaller.

Direct From Mill To Press

News print from the mill of the Hawley Pulp & Paper Co. at Oregon City, Oregon, just 14 miles up the Willamette River from Portland, takes perhaps as short a route from mill to press as is to be found anywhere.

A fleet of five big trucks keep busy 16 hours every day hauling paper from the mill direct to the Portland Oregonian and to the mill's warehouse in East Portland. Each truck carries 11 rolls which have a total average weight of more than seven tons, and each truck rolls up some 3000 miles per month.

Perhaps this Hawley-Oregonian combination is as close as the big daily presses ever get to printing almost on the tree itself.

The Oregon Coast

One of the last of America's industrial frontiers
backed by 176 billion feet of standing timber

FROM the Columbia River south along the Pacific Coast of the United States Nature has not been prodigal with harbors. In the seven hundred miles from the Columbia to San Francisco, one can practically name on the fingers of a hand those places where a ship of any description can put in. And, of all these places, Coos Bay, in the southern central portion of the Oregon Coast, lays claim to the finest deep water harbor.

That in itself is quite a point. The federal government has so far expended several millions of dollars at Coos Bay in building jetties for a sea entrance and in dredging the inner harbor. And more will be spent, for the industrial potentialities of this frontier community, perhaps the last in the United States, are truly great. At present the harbor has a minimum depth of 21 feet, but Coos Bay people are working to increase this to 25 feet. And they deserve to get it.

Coos Bay is a world port. Ships of many flags call in there, but at present most of them fly the Japanese flag, for Coos Bay is the home of the famed Port Orford cedar, a wood very much in demand in Japan. Ships of 500 feet in length have called in at Coos Bay, but the 21-foot depth of channel is not sufficient for them to clear with full cargoes, altho 3,000,000 feet of lumber has been taken out by a single ship.

Lots of Timber

Timber will perhaps always be an industrial backbone of Coos Bay. The claim is made that tributary to this port there are some 176 billion feet standing. And in that statement is found argument for presenting to readers of a pulp and paper industrial magazine a brief lesson in geography. Those billions of feet of timber contain some very fine stands of pulp timber. Sitka spruce, the Pacific Coast's premier pulpwood, is found in this region in considerable profusion, and there is also much white fir, another wood valuable in pulp making but quite a weed to the logger and lumberman. Of hemlock there is an abundance also, and for the sawmills there is plenty of fine Douglas fir and Port Orford cedar.

Logging and lumbering have been carried on in the Coos Bay district for many years, but not until last month did any of the logs find their way to a pulp mill located in the district, altho some logs have moved out to pulp mills in the Columbia and Willamette valleys.

It is essentially because of the few harbors, potential or actual, that much of this vast stand of timber in Southwestern Oregon must find its way to the world of commerce thru Coos Bay, for there is offered the better harbor. Even timber which does not strictly belong in the Coos River watershed will find its way to Coos Bay mills either now established or to be built in the district.

As for rail transportation, the Southern Pacific has a branch line extending to Coos Bay 166 miles from the main Coast line junction at Eugene in the Willamette valley. There are hopes that within a few years Coos Bay will become the terminus of a cross state railway, thus giving more direct access to transcontinental traffic.

Coos Bay has two separate roads, one of which is paved or macadamized for its entire length, connecting it with the main Pacific Highway which extends in a continuous ribbon of concrete from Vancouver, B. C., to the Mexican border. The Roosevelt Highway, already finished as far south as the California line, will be completed to the north within two years.

It can be truly said that Coos Bay is rapidly outgrowing its period of isolation by virtue of increasing transportation facilities. And with these increasing facilities, land and water, there is hope of building up a two-way traffic which will do much to develop the port. That is a chief difficulty at present, there is an excess of outbound cargo, nearly all of which originates in the forest.

Rainfall Ample

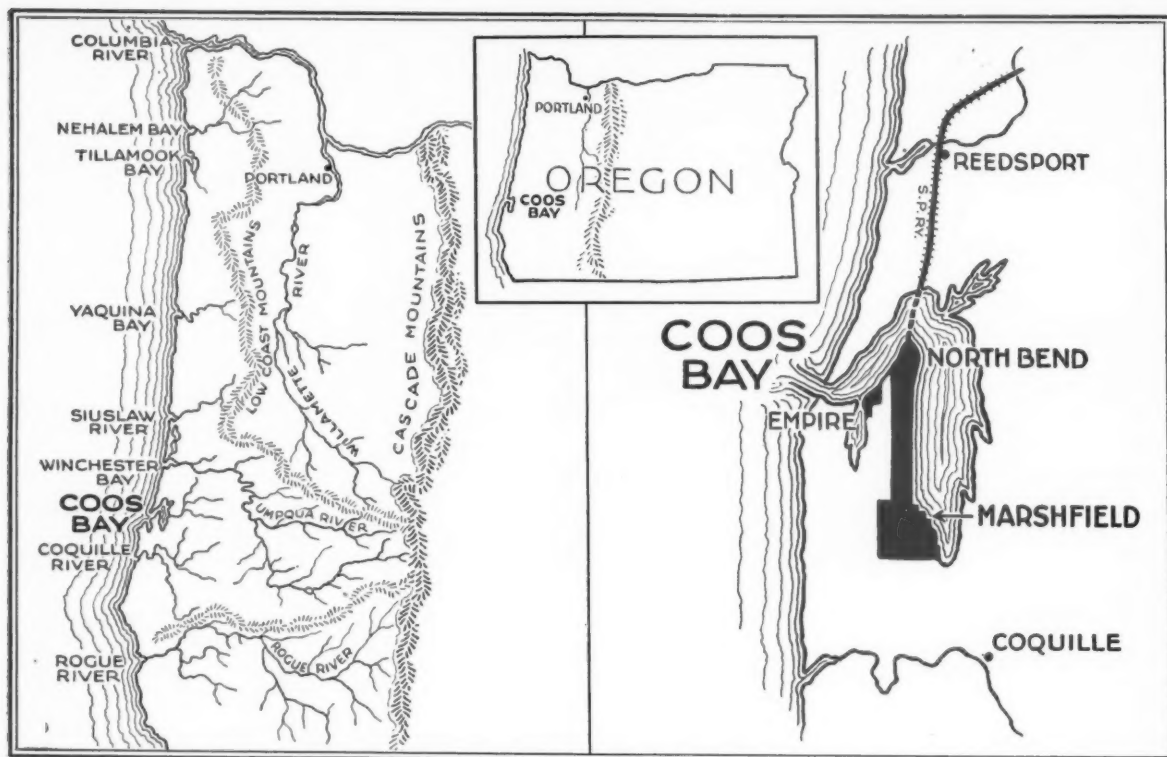
The Mountain States Power Co. now serves the district with electric power and is right now building an extension to its steam plant on Coos Bay. Hugged fuel and coal, mined at salt water on the harbor, offer fuel security in addition to potential waterpower developments.

The Coos Bay district has a moist, equitable climate. It has an average rainfall along the coast levels of 65 to 70 inches a year.

Altho the Coos Bay region has this fairly heavy normal rainfall it is not too well equipped with industrial water supplies. The streams tributary to Coos Bay are short and do not offer too advantageous water storage or draw-off, but opinion on this is divided and many can be found who argue earnestly that as much water as industry will need can be brought to Coos Bay advantageously. Some answer to this question might be found in the several large lakes which lie just within the Coastal shore, a few miles north of the harbor.

There are two rivers of fair size north and south of Coos Bay, the Umpqua and Coquille respectively, the watersheds of which are extensive and must perforce send a big percentage of their timber out thru Coos Bay, for the ports at their mouths are rather negligible.

The Oregon Coast is as yet very thinly peopled. In the back country lying between the low Coastal range and the sea there are no settlements to speak of. The few concentrations of population are mostly found at the harbors, and of these Coos Bay harbor outstrips



A map of the Oregon Coast country.

them all with a combined population of 20,000 people. Marshfield, the largest of the Coos Bay communities, is quite a modern little city of 7000. North Bend, adjoining it on the north, is somewhat smaller. Other communities scattered along the harbor include Empire, Charleston, East Side.

As for industries there are several sawmills, veneer manufacturing plants, furniture factory, fisheries and dairies. Production of electric storage battery separators from Port Orford white cedar is a thriving and unique industry there. Industry in Coos Bay has veritably taken a stand in the wilderness, but it is there

and urged early action on the measure inasmuch as they were desirous of going ahead with construction at once. The council authorized its solicitors to meet representatives of the company to prepare the by-law which will guarantee interest unconditionally on the issue of 6½ percent bonds.

It is proposed to spend approximately \$2,000,000 on the new mill, which will be equipped to manufacture book and printing paper, fruit wrappers and similar products.

Contract for the building of the first unit has been let, subject to the passage of the by-law. Cost of this first unit will be about \$800,000.

Hedin Resigns From Union Bag

Joseph Hedin resigned his position as general superintendent of the Union Bag & Paper Power Corporation's 120-ton kraft pulp mill effective December 1. He has not made any definite plans for the future, he states. He expects to take a bit of vacation before embarking on any new work. Mr. Hedin was an active figure in the design and construction of the Tacoma mill, a principal feature of which was the development of an odorless process.

New Westminster Seeks Bond Aid

The proposed by-law to guarantee interest on a \$300,000 bond issue for the reconstruction of the Westminster Paper Company's mill at New Westminster may be submitted to the property owners before Christmas, although the exact date has not yet been determined. President J. J. Herb, Bellingham, and H. M. Lord, secretary, attended a recent meeting of the city council

May Organize Coast Mill Association

Preliminary steps looking to the organization of western mill executives were taken at a meeting of eight pulp and paper men held November 7 at the Benson Hotel, Portland. While no public announcement was made regarding matters discussed, it was learned that the representatives were unanimous on one thing: that an association of mill men is needed.

With this thought in mind, the following mill executives were named to serve on a committee to develop plans for such an organization: William Howarth, president and treasurer of the Everett Pulp & Paper Co., Everett, Washington; Max Oberdorfer, president of the St. Helens Pulp & Paper Co., St. Helens, Oregon, and George Houk, executive vice-president of the Hawley Pulp & Paper Co., Oregon City, Oregon.

The committee will report back at a future meeting, when responses to invitations now out have all been made.

Automatic Control in Industry

A discussion that looks into the future

By S. A. STAEGE, Paper Mill Engineer
Westinghouse Electric and Manufacturing Company

CAN we conceive of automatic machinery which will automatically sort sheets of paper at the rate of one thousand sheets per minute perhaps, taking the paper from the paper machine and cutter at several thousand feet per minute, throwing out all sheets with blemishes of any kind, spots, dirt or holes, no matter how small and passing only perfect sheets, and counting them at the same time. Such are the possibilities through the use of modern control devices including such wonders of sensitivity and instantaneous response as the photo-electric cell, the grid-glow tube and other modern inventions in which action takes place at the speed of light.

A great deal of development may be required before paper can be sorted at such a rate without being touched by human hands, but few things worthy of accomplishment along the lines of automatic electric control are impossible of accomplishment, and it is only necessary that there be sufficient incentive and worthy object in view to accomplish the seemingly impossible.

Modern industry has advanced from the time when everything was done by hand, through the mechanical evolution of the years, and has seen the use of electricity rapidly reduce man's burdens, and at the same time, greatly increasing his productiveness and efficiency.

Not long ago manually operated controllers were necessary to start and stop or adjust the speed and operation of the electric motors in the factory and in the mill. More recent practice has seen pushbutton control popularized and with remote control enable an operator to start or stop his machinery or adjust its speed with the convenience and slight exertion of touching an easily accessible pushbutton, adjacent to the machine whose operation he must control.

The Eye Can't Keep Up

The edict of modern business is greater and greater production, more rapid performing of various functions and greater precision of all operations. The ability of an individual to observe operations as rapidly as they occur and properly control them in high speed manufacturing processes has been taxed to the limit, in fact has been exceeded. Not only can the eye no longer follow many of the operations which must be controlled but the hand is not swift enough nor are the nerves fast enough or sufficiently sensitive to function as the control and actuating element in modern high speed industrial life.

Researchers of the great laboratories of the country, delving into the mysteries and inner secrets of nature, have made possible the development of instrumentalities infinitely more sensitive than the senses of man, faster than sound, approaching in fact the velocity of light and capable of being put to work to do the things which man has done before, and many other things which man could never do. These means of rapid control are positive and untiring and open up

vistas of progress which will surely increase our national efficiency to an immeasurable degree.

Rapid as has been our progress during the past few years in the development and use of automatic control, the surface of the possibilities has hardly been scratched but we are now at a point where far greater advantage can be taken of these few facilities than ever before.

S. A. STAEGE
Paper Mill Engineer
Westinghouse
Electric &
Manufacturing Co.



We now control speed automatically with such precision that in application such as sectional paper machines and other similar drives, that not one revolution variation in speed will take place between sections over days or even weeks of time. Voltages of huge generators are regulated and controlled within a small fraction of 1 per cent. Current regulators operate with similar precision and control devices are now in commercial use on paper machines which accurately regulate and control the tension of the paper going to the reel from the paper machine and from the unwinding spool to the winder. Pressure and temperature control for various applications are available although many of them have not been developed to their highest state of sensitivity and effectiveness. There are already automatic control and regulating devices of a great variety available to industry and recent discoveries, inventions and developments have done a great deal to simplify and improve such devices as well as to extend greatly the range of their use.

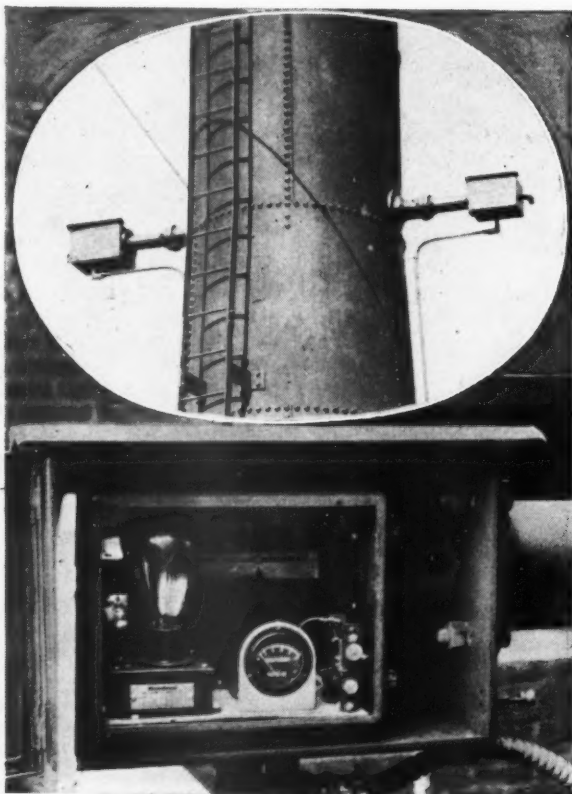
One of the reasons why automatic control has not been more extensively used in the past has been the extreme delicacy of many such devices and their unsuitability to general industry applications where skilled operators were not available for their care and maintenance. Ruggedness is desirable and reliability with freedom from maintenance are requisites in most industrial applications.

The carbon pile type of voltage regulators and carbon pile type section speed regulators used in the latest Westinghouse sectional paper machine drives, and the

carbon pile speed regulator for single motor paper machine drives, illustrates the present day trend in the design of automatic control apparatus. In this way we are getting away from the highly delicate types of instruments and replacing them with rugged devices like the carbon pile regulators, where little or no adjustment is necessary and substantially no maintenance is required.

The sectional paper machine drive now so extensively used illustrates very well the ruggedness and reliability of a highly sensitive control system.

Among the automatic control devices either in use at



Above is shown a smoke indicator installation with the light source on the right and photo electric amplifier and control unit on the left. Smoke density is recorded by graphic meter in the boiler room. Below is a close-up of the photo electric amplifier and control unit.

the present time or to which the industry can look forward to in the future might be mentioned the following:

The automatic load regulator for electrically driven pulp grinders, speed regulators for water wheel driven grinders, stock consistency indicators and regulators, not only for controlling the consistency in the flow box; paper thickness indicator, recorder and regulator, paper dryness regulator, indicator, etc., automatic counting, paper sorting and color matching devices, automatic control for synchronizing conveyors, elevators, etc. These are only a few of the many possible ways in which the electrical manufacturer has come and will come to a greater degree to the aid of the industry.

What the industry should do at the present time is to make a study of the ways and places where their processes might be improved, operation expedited and costs reduced by the use of suitable automatic control methods.

Minton Allies With Five Machine Builders

An announcement of great importance to the pulp and paper industry just released by the Minton Vacuum Dryer Corporation of Greenwich, Conn., states that the Bagley & Sewall Company, The Beloit Iron Works, The Black-Clawson Company, The Pusey & Jones Corporation, and Rice, Barton & Fales, Inc., have become associated with the Minton Vacuum Dryer Corporation and acquired licenses under the Minton Patents to build and sell Minton Vacuum Dryers in the United States.

The invention of the Minton Vacuum Dryer dates back to 1914 when the first models were experimented with. From time to time, Minton patents have been issued, until at the present time there are more than 32 United States Patents issued covering the Minton Vacuum Dryer.

The Minton Vacuum Dryer Corporation was formed in 1926. Up to the present time there is in operation or under construction a total of 11 Minton Vacuum Dryers for the drying of special board, news print, bleached sulphite pulp, bleached kraft pulp, pulp for rayon, and 100% rag stock ledger papers. Among the purchasers of the Minton Vacuum Dryer are the Bakelite Corporation, Price Bros. & Co., Ltd., the Brown Company, the Olympic Forest Products Company and the Byron Weston Company.

The various installations of Vacuum Dryers made in the last two years have more than proved all the claims made for the vacuum drying process, Minton executives assert. These installations cover small and large machines of both slow and high speed type. Two Vacuum Dryers, 234 inches wide, have been supplied to Price Brothers & Co., Limited, for their mill at Riverbend, P. Q., Canada, and have operated at speeds in excess of 1,000 ft. per minute, making standard news print paper at a greatly reduced manufacturing cost. A recent installation drying sulphate pulp has proved that pulp can be dried down to a very low moisture content without reducing the initial strength of the pulp, thus permitting pulp of low moisture content to be shipped with a great reduction in freight rate.

The association of the five machine builders mentioned above with the Minton Vacuum Dryer Corporation will make possible economies in the design and building of the Dryer and because of the close cooperation of the Minton Vacuum Dryer Corporation with each of the machine builders sales costs will be materially reduced.

An association of this kind has been found advisable because of the increasing use of Vacuum Dryers by the trade and the necessity of rapid and economical manufacture and distribution of the Vacuum Dryer throughout the paper industry.

Increasing Pulp Wood Barging Facilities

Pacific (Coyle) Navigation Company of Vancouver, B. C., has purchased three steel barques from the Robert Dollar Co. for handling the movement of pulp logs from the Queen Charlotte Islands to Powell River, Ocean Falls and other pulp centers. The barques will be reconditioned and converted into log carriers in Vancouver.

Barging pulp logs has been found more efficient than booming them from Queen Charlotte Islands owing to the long stretch of open sea to be encountered between the islands and the mainland.

Powell River Begins Big Work

Construction of several units of the Powell River Company expansion job in British Columbia is now getting under way and a start on the biggest single item—the 5,880-foot tunnel from Lois River to Stillwater—may be made before the end of the year.

Powell River Company has awarded a blanket contract to the Stuart Cameron Co., contractors and engineers, for the entire project, involving approximately \$6,000,000. They are to complete by July 1, 1931. This includes clearing a right of way between the power plant site at Stillwater, erection of power lines over the same route, construction of a temporary dam on Lois River, driving the tunnel, building steel penstocks and power plant and execution of various plans for increasing the pulp and paper capacity at Powell River.

Stuart Cameron Co. have already started clearing the right of way which is to be 200 feet wide and 12½ miles long. The ground to be covered is chiefly logged over land, the area having been cleared of its heavy timber in past years by Brooks-Scanlon and other logging interests.

New Machine

Just at present, however, the chief activity of the contractors centers around the establishment of camps. Meanwhile engineers and draftsmen are working on plans and specifications on details that have not yet been decided upon fully.

One of the points which has not yet been settled is the choice of a paper machine, officials state. Bids will be called for in due course. The company will probably specify a 226-inch machine to trim 210 inches. It will be a three-roll machine.

The two machines first installed at Powell River were of the two-roll 140-145 inch type. These were installed at a time when newspapers demanded newsprint chiefly of 72 inch widths. The second battery of machines had a width of 175 inches with allowances.

The last two machines trimmed paper to 219½ inches; they made allowance for oversize rolls, which is a desirable feature in view of the company's important business with Australia, where large sizes are popular with publishers.

However, the major demand now is for a width of 70 inches or under and the new machine will be designed to meet that requirement. While the width will be a little narrower than that of its recent predecessors, the new machine's output will be approximately the same.

More Grinders

Although the company has not yet decided on the dimensions of these units, it is announced that a new machine room building will be built at Powell River, also a new grinder and screen room, an additional digester in the sulphite department and additions to the boiler house and steam plant. In fact, all pulp departments of the mill be increased to the extent of about 25% to take care of the general stepping up in output which the Lois River development will make possible. The new power plant is expected to develop 18,000 h.p. and news print output will be increased by 35,000 tons annually.

The company now operates fifty-two grinders and this battery will be increased to sixty-five, continuing the line.

The temporary dam will be completed during low water next summer. While the dam will be sufficient to meet present requirements for power, it will be used later as a base for the permanent dam to be established when the company has need of the maximum power to

be drawn from Lois River and the adjacent water courses. The tunnel will be concrete lined with an inside bore of 12½ feet. Steel penstocks, 11½ feet in diameter will lead from the mouth of the tunnel.

Stuart Cameron will have personal charge of the contract work on behalf of his company and will employ about 500 men.

R. Bell-Irving, resident mill manager of the Powell River Company, and P. Sandwell, resident engineer, will represent the paper company. B. C. Condit, who was recently engaged on the Pacific Mills development program at Olean Falls, B. C., will act as consulting engineer.

The groundwork for the big job has now been completed, in the opinion of Powell River officials. The entire program was recently given full approval by directors at a meeting in Minneapolis, which was attended by S. D. Brooks, executive vice president, and A. E. McMaster, general manager.

Company Incorporates In Delaware

The Pacific States Pulp & Paper Co., which contemplates the construction of a 100-ton sulphite pulp mill in the vicinity of Priest River, Idaho, incorporated November 19, 1929, under the laws of the State of Delaware through a resident agent, the Colonial Charter Co., 304 Ford Bldg., Wilmington, Del.

The incorporators are Charles W. Beardmore, Priest River; A. T. Peterson, and L. E. Van Winkle, Hutton Bldg., Spokane, Wash.

The company has an authorized capital stock of 60,000 shares class A common with a par value of \$50, and 350,000 shares class B common of no par value.

The nature of the business is to underwrite, purchase, sell, exchange and dispose of and generally deal in shares, stocks, debentures, bonds, scrip, promissory notes, mortgages, securities and other evidences of indebtedness.

The present personnel of the company is essentially that which about three years ago proposed, but did not build, a similar mill near Aberdeen, Wash.

At a recent meeting of the stockholders held in Priest River a finance committee was appointed to endeavor to raise some \$50,000 locally. The meeting was addressed by representatives of the Fiscal Engineering Co., Chicago, and E. C. Nelson, consulting engineer and vice-president of the O'Keefe-Orbison Engineering Co. of Appleton, Wis., who discussed the possibilities of financing and the suitability of the region for pulp manufacture.

No official statement with regard to beginning of construction has been made.

A change of company name to Pacific States Forest Products Co. is contemplated.

Northwestern's Stockholders Meet

One hundred and five Northwestern Pulp & Paper Co. stockholders, representing \$83,000 of Northwestern stock, voted at a meeting held at Oregon City December 7 to raise a maximum of \$4,150 to be used in securing redress from company directors accused of being a party to the alleged disappearance of \$260,000 pledged for building a pulp mill at Astoria.

The money to be raised is to be turned over to Burr E. Tatro and Christian Schuebel, both of Oregon City, with full authority to use as they decide in their efforts to compel the directors to either build the mill or to refund stockholders' money.

Crown Zellerbach Net Profit Gains

Crown Zellerbach Corporation, for the six months ended October 31, 1929, reports net profit aggregating \$3,027,628 compared with net profit of \$2,753,197 for the corresponding period of last year.

Net profit for the half year increased approximately 10 per cent over the same period in 1928. The increase was not reflected in a proportionate gain in per share earnings which amounted to \$1.13 per share on 1,991,680 common shares outstanding October 31, 1929, after preferred dividends of \$783,571 as against \$1.14 per share on 1,971,617 shares after preferred dividends of \$514,373 for the six months period in 1928.

Among acquisitions made during the semi-annual period just ended, was the purchase of the Carthage Mill of the West End Paper Co., which has an appraised value of more than \$1,000,000. Extensive improvements are being made in the Camas plant of Crown Willamette Paper Co. and the Ocean Falls plant of Pacific Mills, Ltd.

Net profit available to Crown Zellerbach Corporation for the second quarter ended October 31, 1929, totaled \$1,382,958, equivalent, after preferred dividends aggregating \$391,624, to 50c per share on 1,991,680 shares outstanding. Profit before depreciation, depletion, bond interest and United States and Canadian income taxes amounted to \$3,522,121. Depreciation in the amount of \$931,061 was deducted; depletion to \$347,039. United States and Canadian income amounted to \$230,086, while bond interest amounted taxes for the period were \$223,500 and minority stockholders interests were \$407,476.

Comparative income statement of Crown Zellerbach Corporation for the six months period ended October 31, follows:

	6 Months Ended	
	Oct. 31, 1929	Oct. 31, 1928
Profit before depreciation, depletion, bond interest and United States and Canadian Income Taxes	\$7,206,710	\$6,636,038
Depreciation	1,747,225	1,495,493
Depletion	447,616	353,293
Bond interest	696,915	719,257
U. S. and Canadian Income Taxes	460,274	447,491
Minority stockholders interest	827,052	867,305
Crown Zellerbach net profit	3,027,628	2,753,197
Crown Zellerbach Preferred dividends	783,571	514,373
Balance for common	2,244,057	2,238,824

Crown Zellerbach Corporation earnings for the six months ended October 31, 1929, amounting to \$1.13 per share on the common shares compare with dividend requirements of 50c for the period. Preferred and preference dividend requirements for the half year, amounting to \$783,571 were earned 3.86 times. Preference stock pays \$6 per share per annum and both the Series A and B are convertible into common stock in the ratio of three shares of common for each share of preference stock any time prior to December 31, 1933. Extension of the conversion time may be accomplished by the directors.

Regarding results of the semi-annual period just ended, President I. Zellerbach said: "The gradual improvement in the paper industry is continuing at a steady though moderate rate. Stocks of paper are being gradually reduced and prices of paper and paper products are stable. Demand shows a consistent growth. In order to meet this demand we have been adding to our plant capacity, particularly in the East, where the recently-acquired plant of the West End Paper Company at Carthage, New York, is now being remodeled and enlarged. It is expected to be put in operation by February 1, 1930, as part of the National Paper Products Company division of the corporation

in connection with its other plant in Carthage. Distribution of Crown Zellerbach's products is now being made on a large scale throughout the Atlantic states."

Crown Zellerbach Corporation's wholly owned subsidiary, Crown Willamette Paper Company, earnings for the six months ended October 31, 1929, were \$1,900,661 as compared with \$1,697,828 for the similar period in 1928, an increase of \$202,833. These earnings were net after deduction of all charges including depreciation, depletion, bond interest, and federal income tax, and before including its proportion of the dividends or earnings of Pacific Mills, Ltd.

Crown Willamette Paper Company owns 92.70 per cent of the common and 71.00 per cent of the preferred stock of the Pacific Mills, Ltd.

The consolidated earnings of the company for this six months' period, after including its proportion of the earnings of Pacific Mills, Ltd., were \$2,250,219 as compared with \$2,196,045 for the similar period in 1928. These earnings are likewise met after deduction of all charges, and were equal to five times the bond interest. The first preferred dividend requirements were earned three times over, and the second preferred dividend requirements were earned twelve and one-half times.

The balance of earnings is equivalent to \$1.43 per share on the common stock or at an annual rate of \$2.86 per share on the common.

EARNINGS OF CROWN WILLAMETTE PAPER COMPANY AND WHOLLY OWNED SUBSIDIARIES

	Six Months Ended October 31, 1929	6 Months Ended Oct. 31, 1928
Profit before charging depreciation, depletion, bond interest and Federal Income Taxes	3,616,970.93	3,940,875.02
Depreciation	781,569.38	796,892.30
Depletion	344,363.89	430,021.20
Bond Interest	578,359.35	562,795.59
Federal Income Taxes	214,849.64	250,504.96
Net Profit	1,697,828.67	1,900,660.97

EARNINGS OF PACIFIC MILLS LIMITED

(Controlled by Crown Willamette Paper Company)		
	6 Months Ended Oct. 31, 1929	6 Months Ended Oct. 31, 1928
Profit before charging depreciation, depletion, bond interest and Canadian Income Taxes	1,201,767.69	1,039,731.55
Depreciation	427,470.84	493,417.71
Depletion	8,929.47	17,594.60
Bond Interest	133,266.00	127,796.50
Canadian Income Taxes	93,641.11	47,311.84
Net Profit	538,460.27	353,610.90

More Crown Zellerbach Shares Listed

A total of 780,000 additional shares of Crown Zellerbach Corporation Common has been admitted to trading on the New York Stock Exchange, bringing the total number to 2,780,000.

It is pointed out by executives of the corporation that the move has no significance other than to list the requisite number of shares of common to accommodate conversion of Crown Zellerbach \$6 preference stock Series A and B. The preference stock of either series is convertible into common stock in the ratio of three shares of common for each share of preference stock any time prior to December 31, 1933.

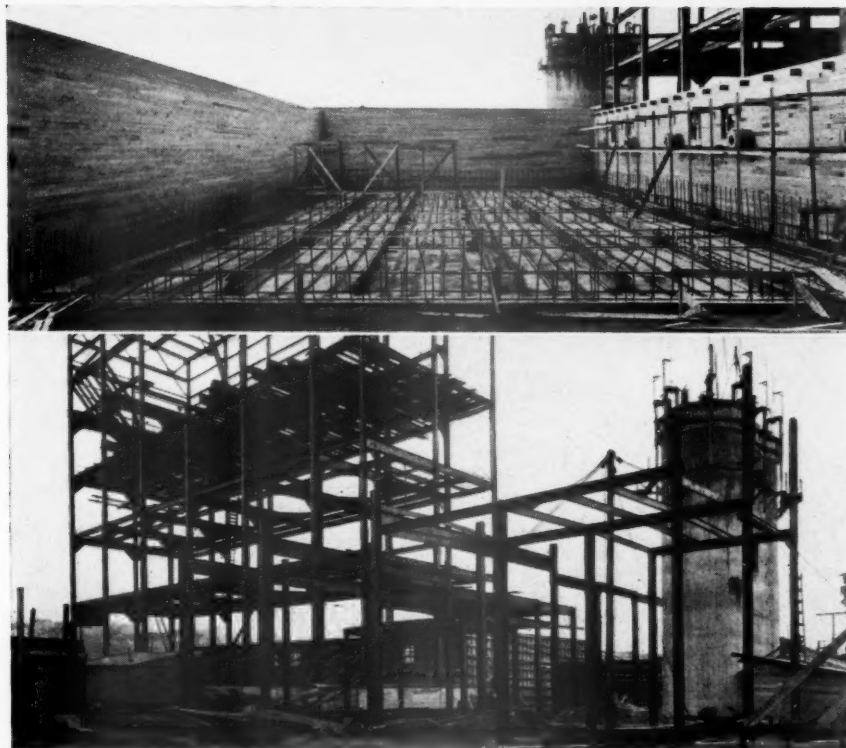
Extension of the conversion time to a latter date may be accomplished by the Board of Directors. There are 198,334 Series A preference shares and 60,000 Series B shares currently outstanding.

Washington News Print to South America

One of the few foreign shipments ever sent out by the Washington Pulp & Paper Corporation's mill at Port Angeles, Wash., was a lot of 1,100 tons of news print loaded aboard the steamer West Ivis for delivery in Buenos Aires, Argentina, late in August.

These two views taken the first week of December show the progress of construction on the new 175-ton capacity bleached sulphite pulp mill of the PUGET SOUND PULP AND TIMBER CO. at Everett, Washington, and depict as well the solid character of the buildings.

Above, blowpits. Below, steel for digester house with acid towers at right.



Many New Features in Puget Sound Mill

Construction of the new 175-ton bleached sulphite pulp mill of the Puget Sound Pulp & Timber Co. at Everett, Wash., has been favored during the past month with fine weather prevailing and the officials are expressing confidence that production will begin not later than June 1, 1930. A large force is at work and much change is noted on the 32-acre waterfront site in the past 30 days.

When completed the mill will mark another important step forward in the development of the pulp and paper industry of the Pacific Coast. A number of deviations from past practice, together with various betterments and improvements, will class this mill when completed as one of the largest and best for the manufacture of high grade bleached sulphite pulp.

Hardy S. Ferguson, consulting engineer in charge of design and construction of the new Puget Sound mill, is endeavoring to make the mill an outstanding one in point of equipment and refinement in chemical control to produce a high grade product.

One of the major deviations in pulp mill practice in this plant from any that have been heretofore constructed in the United States is the building of a sizeable saw mill within the layout to operate strictly as a plant utility for the purpose of breaking down both large and small logs to uniform size cants to insure a perfect control in the making of uniform chips.

With many unique features, as saw mills are classed, it will serve to cut the logs economically directly under the inspection of the pulp mill supervision, all for the purpose of, by mechanical means, sawing selected wood square, free from bark, sap, dote, or knots before leaving the mill for the chipper building.

The chippers are selected of a variety of sizes to permit selection of wood of most suitable size to fill the spout of the chipper and thus insure a minimum

of uneven sized chips and slivers that are usually a problem in mills where large and small pieces are all chipped in the same machine.

The Puget Sound Pulp & Timber Co., having its own timber holdings, will furnish for the plant merchantable camp run logs. The average size of the logs furnished to the plant will be 40 feet in length from 12 inches to 40 inches in diameter, from which will be cut square cants. The cants will be thoroughly selected and cleaned by means of a washing system before entering the chipper building.

The chips will be conveyed on an inclined belt conveyor to be directly distributed over large chip bins above the digesters. Five 19-ton digesters are being installed in the first unit of the plant, giving ample digester capacity to cook the estimated output from 14 to 16 hours.

The liquor will be drained off before the stock is discharged into the blow pits. For washing the stock in the blow pits, water, heated by means of coils thru which the discharged liquor has passed, will be used to insure thoro first washing in the pits.

Stock is then stored in large brown stock chests having sufficient capacity to blend the total output of five digesters in a proper manner to insure uniformity. From these chests the stock is pumped to a flow box thru knotters, then over dewatering devices to reduce the consistency to 10 per cent.

From these dewatering devices the stock is passed thru pulp separators, a special machine used for the purpose of thoroly disintegrating the fibres. From these devices the stock passes over a complete series of specially designed felt rifiers before entering the screens. Ample flat screens are provided to give careful screening of the brown stock before entering the bleachers.

Bleaching is a two-stage system with many details

and new features and this installation is supplied completely by the Pulp Bleaching Corporation of New York. From the bleachers the stock is washed and in the proper form pumped to another complete set of bleached stock rifiers, after which it is passed over a second series of screens for screening of bleached stock before passing on to the dryers.

The drying is done over two large fourdrinier pulp drying machines, specially designed with pre-dryers to permit the passing of a thin sheet at relatively high speed over an ample number of drying cylinders to dry the stock under lowest temperature possible.

Provisions are made in the plant for an up to date laboratory with the latest of equipment for complete chemical research and control.

The plant buildings are to be of the best type of concrete, steel and brick. The mill will have excellent water and rail facilities for shipment, the company's own docks offering a unique combination for economy in handling pulp and chemicals. The company's dock will be provided with an overhead electric railway to transfer from ship side sulphur, limestone and lime direct to the storage bins of the various chemical units. Pulp storage is located on the company's dock with direct reach to ship side or rail.

The buildings are so arranged that the doubling of the plant can be carried on without interference with the operation of the first unit, and the dryer room for the second unit is now being built to be used as a pulp storage until the second unit is put under construction.

Coast News Print to Latin America

John Bruno Wasserman, head of Wasserman & Company, Buenos Aires, one of the biggest importers of news print in the Argentine, was a recent visitor to British Columbia. He spent a couple of days at Powell River as a guest of the Powell River Company.

British Columbia has increased its news print trade with the Argentine materially in recent years and 50% of that country's entire news print purchases are now in Canada, although eastern Canada mills take a large share of that total.

Owing to competition of eastern mills British Columbia news print producers have found some difficulty in maintaining their market in the British West Indies, but on the west coast of South America sales are constantly increasing. About 80% of the news print consumed by Colombia and Panama is now purchased from a single British Columbia company.

Read Resigns Position With Crown Willamette

Douglas E. Read, superintendent of the kraft mills of the Crown Willamette Paper Company's mill at Camas, Washington, has resigned to accept a position with the International Paper Co. George Nott is now acting as superintendent of the kraft mill.

Carter, Rice To Have New Portland Office

Construction has been started on a 100 by 100, one-story, reinforced concrete building to be occupied by the Portland branch of Carter, Rice & Co., by March 1, 1930.

The new structure, located at Sixteenth and Johnson streets, will give the Portland branch 10,000 square feet of floor space, or about 60 per cent more room than is available at the present quarters at 71 Front street. Modern facilities will be installed for the rapid handling of stocks, which are to be materially increased, especially

those of fine printing paper. James W. Murphy is Portland manager.

Carter Rice has been named agent for Caslon Bond, manufactured by The Munising Paper Co., Munising, Mich., a complete stock of which will be carried by the Portland, San Francisco and Seattle branches.

Regular Hawley Dividend Promised

Mansel P. Griffiths, president of Hawley Pulp & Paper Co., and northwest manager for Blyth & Co., who control the Oregon City mill, has announced that the preferred stock dividend resumed October 1 may be regarded as a permanent resumption.

This means that it is the company's intention to pay the quarterly 1½% dividend due January 1, 1930, although Mr. Griffiths points out that the Hawley directors have not yet formally authorized its payment.

The removal of all Hawley Pulp & Paper securities from listing on Portland Stock and Bond Exchange was explained as an act conducive to the convenience of the company and its investment banking owners in their effort to work out to best advantage certain management problems.

To Build Board Mill at Salem

The West Coast Board Products Co. has been organized with a capitalization of \$100,000 and proposes to build a small mill at Salem, Oregon of about 10 tons daily capacity to make trunk and binders board, making use of flax waste and screenings from pulp mills.

James G. Heltzel, a Salem attorney, is president. F. D. Thielsen, formerly in the paper jobbing business in Salem, is secretary. Mr. Heltzel is a director along with F. G. Gailbraith and F. Puttaert.

President Heltzel informs that sufficient stock will be sold to cover building costs. He does not anticipate that production will begin for some months.

Bennie Thomas Goes North

Bennie Thomas, sulphite superintendent at Floriston, has gone to Ocean Falls, B. C., to assist in sulphite plant of Pacific Mills, Ltd., during the shut down of the sulphite unit of Crown Willamette Paper Company's mill at Floriston, California.

John Butterworth Passes

John W. Butterworth died at the age of 59 at Everett, Wash., on November 9. Coming originally from England, he joined the Everett Pulp & Paper Co. in 1898, left them for some years and rejoined the company in 1908 in the capacity of wood buyer, which position he held until his death.

Duncan To Be In Charge

Alex C. Duncan, who has represented the Paper Makers Chemical Corporation of Kalamazoo, Mich., for several years on the Pacific Coast, has been named resident manager of the new Portland branch of that concern.

POSTPONEMENT

Due to unforeseen circumstances it has been necessary to postpone the feature story on the St. Helens Pulp & Paper Co. which had been previously announced for publication in the December number.

Raising the Curtain

on the future of Port Angeles

in the Pulp and Paper Industry

PORT ANGELES, Washington, commanding the great timber resources in the Northwest part of the Olympic Peninsula, stands in fair prospect of becoming the most important pulp and paper producing community on the Pacific Coast in light of events transpiring during the past month.

An announcement coming to Port Angeles citizens from Norman Gibbs, resident manager of Crown Zellerbach's subsidiary, Washington Pulp & Paper Corp., and spokesman for the now-building Olympic Forest Products Co., raised the curtain on pulp and paper events that are to be set on the Port Angeles stage in the future.

The program given by Mr. Gibbs follows:

1. Another unit to Washington Pulp & Paper Corporation's plant to increase production from 300 to 600 tons newsprint a day.

2. Construction of hydro-electric plant at Rica Canyon, Elwha river to generate 15,000 K. W. of electricity. This will be in addition to the 16,000 k. w. at Glines Canyon and 12,000 k.w. at Aldwell canyon now installed.

3. Construction of a large steam plant in the west end of the city.

4. Increase in size of the 200 ton bleached sulphite unit being built by the Olympic Forest Products Co. at Ennis creek to one of 500 tons a day capacity, making it the largest bleached sulphite plant in the world.

5. Enlargement of the spruce sawmill at Ennis creek now under construction from the 500,000 feet a day capacity now being installed to one of 1,000,000 feet a day.

Expansion of the Olympic Forest Products Co. pulp mill and sawmill are of course not dependent upon the news print situation.

With such bright prospects before them it was not difficult for Port Angeles voters to repeat their record of last July when by a nearly unanimous vote they authorized a bond issue to pay for a new industrial water system. This time they voted to enlarge the system and cancel the old issue, and they came through on December 3 with a vote of 2438 to 20.

Full details on the proposed enlargement and changes in the water system were published in the November **PACIFIC PULP AND PAPER INDUSTRY**.

Commenting on the successful election Mr. Gibbs said, "our companies are planning big things for Port Angeles that will be made possible by the increased amount of water. Work on the Olympic Forest Products plant is going steadily forward and this plant with others just over the horizon will make Port Angeles one of the greatest pulp and paper centers of the Pacific Coast."

The enlarged water line presently contemplated will pipe a total of 45 million gallons daily to existing or building mills, but the Elwha river will be tapped for 100 million at the take-off, thus leaving a surplus of 55 million gallons available for future industries.

Inquiry at San Francisco and Seattle offices of the Port Angeles mills involved did not bring out any

definite dates for starting construction on the enlarged programs.

Meanwhile concrete is pouring steadily on the first 150-ton unit of the Olympic Forest Products Co. under the direction of Chris Kupplers' Sons, contractors. The old war time buildings are losing their ghostly shape and rising to a new pattern, a modern sawmill. First consignments of machinery for the pulp mill are expected to begin arriving next month.

Port Angeles Dryer Has Many Features

The Minton Vacuum Dryer now being fabricated by Rice, Barton & Fales, Inc., in their Worcester, Mass., shops for the first 150-ton unit of the new bleached sulphite pulp mill of the Olympic Forest Products Co., now under construction at Port Angeles, Wash., will have a number of features differing in many ways from the usual machine used in pulp drying.

A fourdrinier part is used in place of cylinders and this particular fourdrinier is designed for a wire 156 inches wide, and is equipped with a suction couch roll, the usual table rolls, wire rolls, and suction boxes, all of which rolls are to be equipped with anti-friction bearings.

Three main presses are to be used, the first press to be suction type. The felt rolls are to be rubber covered and all of the rolls, both main press and felt rolls, are to be equipped with anti-friction bearings.

The Minton vacuum dryer is the first of this kind to be installed on the Pacific Coast. The dry part consists of 40 dryers, 60 inches in diameter, equipped with upper and lower felts, all of the felt rolls and the dryers to have anti-friction bearings. A single cutter with a duplex attachment is to be used following the vacuum dryer.

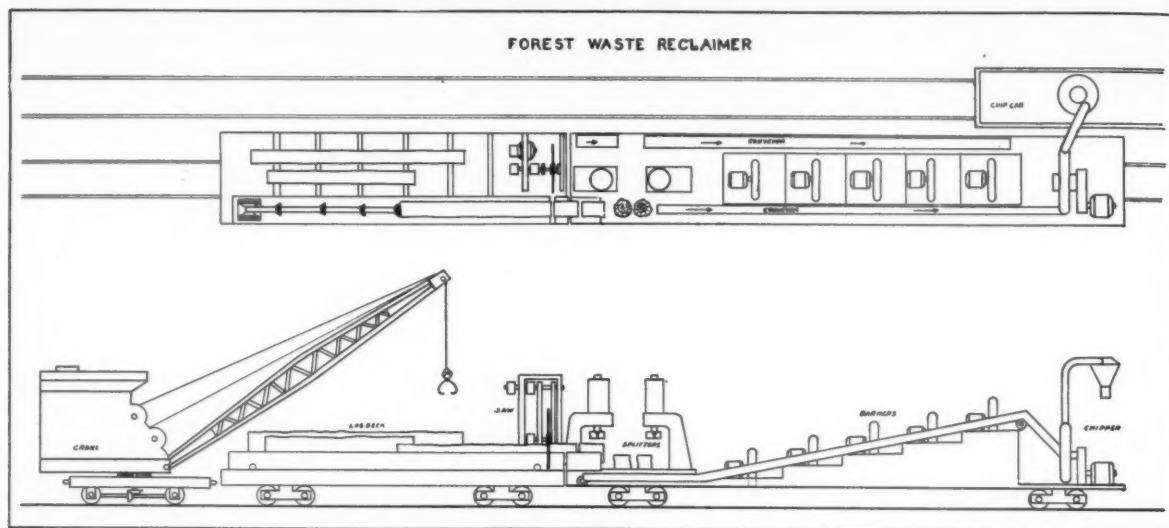
The machine is to be driven by a Westinghouse sectional electric drive. Every roll on the machine is to be equipped with an anti-friction bearing.

The company expects with the use of this machine to turn out a product of improved quality as compared with that now being furnished to the general market.

Kuppler Pleased With Water Bond Vote

George W. Kuppler, one of the four brothers of Chris Kupplers' Sons, contractors, who have built several Pacific Coast pulp and paper mills, is the newly elected president of the Port Angeles Chamber of Commerce. Naturally he is feeling quite jubilant over the highly successful water bond election that Port Angeles put over on December 3, because the civic organization had strived earnestly for success in this direction.

Rejoicing with George W. are the three other brothers, for the contracting firm is now pouring concrete for the new Olympic Forest Products Company's mill which, upon completion, will be a principal customer for the water.



Diagrammatic view of the forest waste reclaimer, or chipping plant on wheels, developed by Mr. Lewis.

A Chipping Plant on Wheels

There have been frequent predictions that there would one day be evolved a chipping plant on wheels. Now comes J. W. Lewis, assistant general manager of the Long-Bell Lumber Co., Longview, Wash., one of the world's largest lumber operators, with such a device which he designates a forest waste reclaimer. It is a portable affair designed to follow directly behind the regular logging operations.

Essentially, the portable forest waste reclaimer consists of a power unit, a cut-up saw, power splitters, a battery of disc barkers, a chipper and chip screens. Accepted chips would be dumped directly into cars.

Mr. Lewis estimates the daily capacity of the reclaimer to be 50 to 60 units of chips per 8-hour shift. Power consumption would be about 200 h.p. per hour.

In operation, as soon as the regular logging operation had moved out light relogging equipment would move in, using the same spar trees and spurs, and cold deck all the logging waste retrievable from the location, the reclaimer following to work up the re-logged material into chips. Thus there would be three units operating, big logger, re-logger, and reclaimer, one step apart in the order named.

Working up the refuse on the spot would eliminate handling and transportation of useless material. Hemlock and fir wastes could be worked up separately if desired. If desirable, hemlock bark, rich in tannin, and Douglas fir bark, which contains much cork, could be salvaged with further auxiliaries.

The machine can be operated by electricity, gas or diesel engine, or by steam from its own fuel from portions of the wood rejected in chip making. Mr. Lewis points out a number of advantages for the reclaimer:

- Portable—can go anywhere on water, steel rail or good road.
- Reduces forest fire hazards by removing fuel from ground.
- Expedites and reduces cost of reforestation by exposing soil.
- Reduces slash burning hazard by removal of fuel, often making slash burning unnecessary.

- Conserves for reforestation, by reduction of fire destruction, seeds and small trees already on ground.

- Makes available small trees for pulp.

- Enables timber holder to realize more from investment per acre by enhancing merchantable value of timber stands.

- Makes available millions of cords of pulp wood that otherwise would be burned in slash disposal.

Prolongs life of forests in general by utilization of wastes, reducing necessity of sacrificing good lumber logs for pulp.

Portable chipping plants aid the country in general by furnishing the farmer with off season work and an opportunity to dispose of small tree crops on land which it is desirable to clear for agricultural purposes.

Reduces cost of railroad construction by increasing tonnage per acre.

Answers the charge that the lumberman is wilfully wasteful.

Larrabee Will Superintend Olympic Mill

The new mill of the Olympic Forest Products Co., now building the first 150-ton bleached sulphite unit at Port Angeles, Wash., will have Benjamin T. Larrabee in charge of production as superintendent when it begins operation some time next summer.

Mr. Larrabee has resigned his position as general superintendent of the sulphite mill of the S. D. Warren Co. of Cumberland Mills, Maine, and is expected to reach the Pacific Coast about the first of the year.

Sulphite experience of Mr. Larrabee dates back for a quarter century. Upon graduation from the University of Maine as a chemical engineer in 1904 he joined the Warren company and has in the years since that time been in several branches of the mill, holding his superintendency for the past 13 years.

He is an active figure in association work and held the presidency of the American Pulp and Paper Mill Superintendent's Association for one year and a vice-presidency for two years. He is also a former chairman of one of the regional divisions of the Superintendent's organization.

Crown Zellerbach Subsidiary Incorporated

The National Paper Products Sales Co. was incorporated under the laws of Nevada in November as a subsidiary of Crown Zellerbach Corporation to handle some of the National Paper Products Company's products. E. M. Mills, 534 Battery St., San Francisco, was designated California agent.

Mount Holly Paper Co. of Pennsylvania has been purchased by Curtis & Bros. Co. of Newark, N. J. Will be modernized and equipped to make high grade book.

Determination of Stack Losses*

By GEORGE H. HORNE
Western Precipitation Co., Los Angeles

THE solid, or non-gaseous material carried by gases and discharged to the atmosphere, through the stack, usually represents a monetary loss or is the source of a nuisance or it is both.

Plant managers are usually keenly aware of either condition but are often puzzled as to ways and means to definitely evaluate the loss. Occasionally the belief has been held that there is no way by which the quantity of the loss can be determined; consequently they have been accepted and charged against plant operation.

It is not intended to suggest that a new account be opened up with the stack as debtor involving perhaps daily stack loss determinations, though in some smelters, this has been done. A furnace operating under similar conditions of temperature, draft and charge will show from day to day similar losses which can be stated as a percentage of the charge. Therefore, one to two determinations of the stack loss will usually suffice at least until such a time as furnace operations are definitely changed.

The method of stack loss determination to be described is not new, but has been in use quite a number of years during which time it has proved quite satisfactory and reliable. It is not claimed as the "Standard Method" though it comes nearer that title than any other.

Stack Loss Determination

The determination of the weight of solids carried by a gas stream is made in two operations, namely the determination of the rate of flow of the gas in the flue, and the determination of the concentration of solids carried by the gas.

Determination of Rate of Flow

The rate of flow, usually expressed as cubic feet per minute at the temperature and pressure of the flue, is probably most easily determined by a few Pitot tube traverses of the flue section to determine the average velocity of the gas, which with the cross sectional area of the flue, of course, determine the rate of flow.

For the velocity determinations there is required a Pitot tube, a differential draft gauge and a thermometer, or Pyrometer. A suitable location on the flue as regards uniform gas flow and convenience in setting up the equipment is often difficult to find. It is desirable to make the measurements at a point in a straight run of flue at least four diameters, or the equivalent, from the last bend or obstruction or junction of other flues. However, many very satisfactory measurements have been made in much shorter distances and a rapid preliminary survey of a section will often show more uniform flow than could be expected from external appearances. Even in cases where the flow is not as uniform as could be expected from external appearances. Even in cases where the flow is not as uniform as could be desired, a few extra points of velocity determination will serve to give a satisfactory average velocity for the whole flue section. The cross sectional area of the flue section

should be determined from measurements made on the flue itself, not relying on drawings of the flue, and the contour of settled dust on the bottom of the flue is to be noted so as to obtain a true cross sectional area.

If the flue is large and rectangular, it is usually more convenient to provide three or four holes through which the Pitot tube may be inserted to face the gas stream. The points of the traverse should, of course, be approximately at the centers of equal areas and it is evident that the final average velocity calculated for the section will be strengthened by a larger number of individual velocity determinations. A system of marking the depths of insertion on the Pitot tube is easily arranged for the various points.

The Calculation of Velocity

The calculation of velocity is to be made from the velocity head as read on the differential gauge and the temperature by the formula:

$$V=3.9 \sqrt{\frac{29.9 \times}{P} \frac{1.0 \times}{D} H \times T}$$

When: V=gas velocity in feet per second.
H=velocity head in inches of water.
T=Temperature in degrees C absolute.
P=Gas pressure in inches of Hg.
D=Spec. gr. of gas referred to air.

At sea level with the gas pressure equal to 29.9 inches of mercury and with gas having a density equal to that of air, the above becomes: $V=3.9 \sqrt{H \times T}$.

In practice very few cases are found where the specific gravity of the gas differs appreciably from that of air since there is usually sufficient water vapor present to offset the heavier gases.

Calculation of Gas Volume from Carbon Combustion

In paper plants where it may be impractical to make Pitot tube measurements of the recovery furnaces gases, an approximation of the gas volume may be made from the rate of combustion of carbon and CO₂ and water vapor content of the flue gas.

Now while the quantity of sodium oxide input to the furnaces is usually unknown, in this approximation it is assumed that the black liquor carries all of the sodium salts charged to the digesters. Then the analysis of the liquor for sodium oxide and organic carbon will give figures from which the average rate of carbon combustion may be calculated. This figure will obviously be high by the percentage that the washing losses, etc., represent of the actual sodium salts fed to the furnaces. In many cases approximations of these losses may be available.

On this basis then, the ratio of sodium salts in the black liquor having been determined by analysis, the average rate of flow may be conveniently expressed in pounds per minute. Then from the organic carbon content of the liquor the rate of carbon combustion, and production of CO₂ is calculated, which together with the CO₂ analysis of the flue gas determine the dry gas volume. To this should be added the volume of water

*Address delivered at annual meeting of Pacific Coast Section of TAPPI, Tacoma, Washington, October 5, 1929.

vapor carried by these gases to obtain the total volume.

A filtration test to determine the concentration of soda per cubic foot will then determine the total loss.

Concentration of Solids

The determination of concentration of solids carried by the gas merely consists of drawing a metered volume of gas from the flue, passing it through a suitable filter and weighing the solids caught on the filter.

With these figures of metered volume and filtered weight at hand, the concentration or weight of solids per unit volume is at once available.

The concentration of solids is usually expressed, in this country, as milligrams or grains per cubic foot.

A wide variety of equipment may be used in making such a determination, but for convenience and ease of assembly, the following is recommended:

A gas meter capable of operating under a vacuum of 5 inches of mercury, equipped with proper index dials; a thermometer and mercury manometer arranged to indicate the temperature and pressure of the gas as it is metered. A filter thimble holder, a supply of filter thimbles, a sample tube, and a small vacuum pump, or an ejector, for operation on compressed air. In addition to this, if the gas to be sampled has a dew point that is likely to be reached in the metering, some form of condenser will be necessary to collect the condensate ahead of the meter.

The sampling tube, usually most conveniently formed from a piece of 1/2-inch pipe, is threaded into the thimble holder.

Next in the set up comes the condenser, if it is to be used, and following this is the gas meter equipped with the thermometer and manometer. The meter is connected to the aspirating means through a regulating valve to control the rate of sampling and the pressure on the meter. As the sampling goes on and the filter becomes filled with solids, more and more pressure will be needed to maintain the rate of metering selected.

Metering Rate

In paper mill work, where the solids of interest consist of fume, the particle size is so small as to virtually behave like a gas, the rate of metering is of minor importance. In other cases where a mixture of fume and dust particles are present, the metering rate must be adjusted to maintain the velocity of the gas entering the sample tube the same as the flue gas velocity at that point, in order to obtain a representative sample of the total solids. This rate is readily calculated from the temperature and pressure in the flue and at the meter, together with the flue gas velocity and the area of the sampling tip. However, if water vapor has condensed out of the sampled volume ahead of the meter, the calculation is erroneous and a trial run is to be first made to determine the quantity of condensable vapor present.

In reference to the readiness with which fume particles enter a sampling tube, tests were conducted a few years ago at one of the smelters on a fume laden gas to check this particular point. Samples were drawn from the flue at velocities varying widely both above and below the flue gas velocity without effecting the results. Finally the sample tube itself was turned about so as to face down stream, requiring the fume to reverse its direction of flow in order to enter the tube, but even this change did not affect the results.

It is, of course, understood that this applies only to fume and not to dust particles which may be relatively of enormous size as compared to fume particles.

Location of Sampling Point Within the Flue

Where the solid particles are fume, the exact point within the flue from which the sample is drawn is not important, as the distribution of solids is quite uniform. The only precaution that should be taken is to have the tip of the sample tube well away from the walls to avoid the chance of salting the sample by material from the walls.

Time of Sampling

The sampling should be carried on over a period long enough to obtain a sample sufficient for subsequent analysis et cetera. Usually several grams should be obtained.

Data

During the sampling the following data should be taken: Time; meter dial reading; meter temperature; meter pressure; stack temperature; stack velocity.

These readings should be taken at intervals frequent enough so their average will fairly represent the average conditions during the sampling.

Weighing the Sample

Since the filter thimbles used may change weight with changes in atmospheric humidity and also since the material collected may be hygroscopic, it is generally best to dry the thimbles in an oven and weigh them in a weighing bottle before and after the sampling in order to be sure of an accurate weight of the solids filtered from the gas.

Calculation

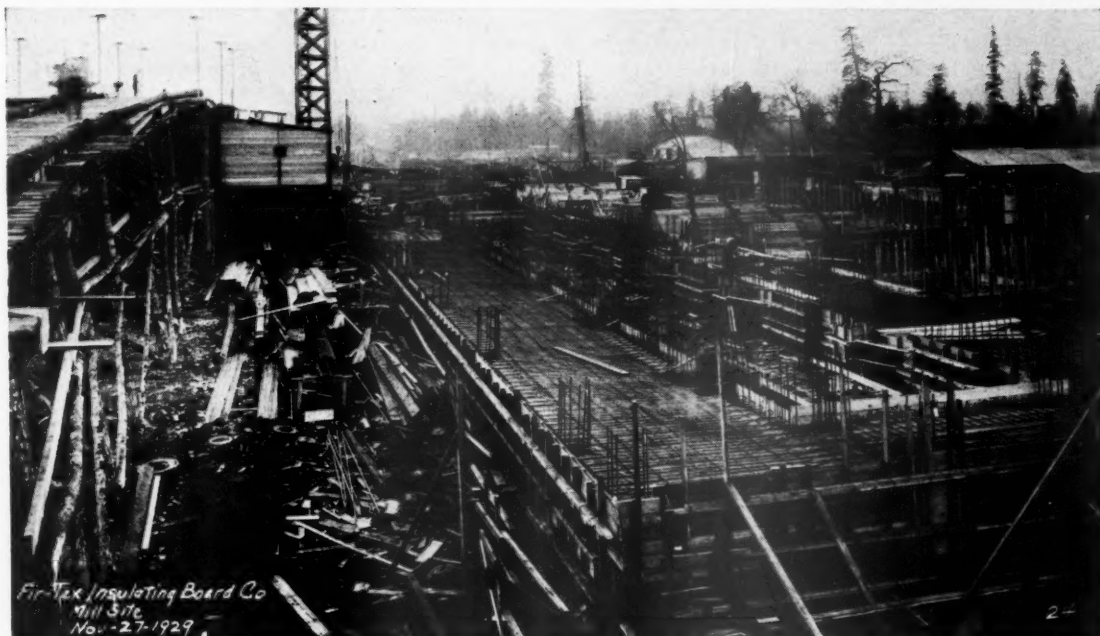
After the test is complete, the metered gas volume is calculated back from the average conditions of pressure and temperature at which it was metered to flue conditions. If water vapor has been condensed its volume has been recorded and this is also to be converted to its vapor volume at flue conditions. The total gas volume taken from the flue is then the sum of the two volumes. This total sampled volume and the weight of the filtered sample then determine the concentration of solids per cubic foot at flue conditions.

Gases of High Vapor Volume—Wet Filtration

Where the gases to be filtered contain a large percentage of water vapor, the dew point may be so high as to condense moisture in the thimble holder. To prevent this, the thimble holder itself is constructed so that it may be submerged in the flue provided the temperature in the flue is not so high as to harm the filter thimble by charring. It sometimes happens that in one position the thimble is wetted by condensation and charred in the other, but between the two some satisfactory arrangement is usually found. Where the solids are water soluble and it is found difficult to obtain the sample in dry form, a wet system of filtering may be employed in which a wet cotton filter is used. It is connected in the set up immediately following the condenser so that the condensate continually drips on the cotton filter to keep it wet. A thick plug of tightly packed wet cotton is an excellent filter, but it must be kept wet, and this the condensate does. At the completion of such a test the quantity of condensate is measured so that it may later be calculated to its vapor volume at flue conditions.

The sample tube, and condenser with connections are then to be thoroughly washed, adding the wash water to the condensate already collected. The weight of solids in solution may then be determined by evaporating to dryness or other suitable means.

(Turn to page 42)



This late view shows how construction is progressing on the Fir-Tex company's board mill at St. Helens.

Fir-Tex Plant Making Good Progress

Judging from present progress being made in construction of the big mill of the Fir-Tex Insulating Board Co., at St. Helens, Oregon, the Pacific Coast will witness initial operations of its first insulating board mill about June 1, 1930.

The solid rock outcroppings at the St. Helens site considerably advanced the construction by eliminating piling work except for dock structures. By now a crew of 80 carpenters and 20 reinforcing steel men are working ahead of the concrete which is being poured at the rate of 25 cubic yards per hour.

All units of the plant are being worked on. The concrete tower is about 100 feet high now but will be raised to 165 feet as construction progresses to give a distributing radius of 650 feet. Sand and gravel barges are towed to the site and unloaded to bunkers on the company's own docks, and from there trucked 1000 feet along the dock to the concrete tower and mixers. A mile-long rail spur is already in.

The office and laboratory building will be ready for occupancy by January 15.

By now, according to A. E. Millington, vice-president and general manager, all equipment contracts with the exception of the wood room have been placed.

Biggs Boiler Works are working on six globe rotary digesters and two of them are ready to be shipped. The other four will follow within the next two months.

Foundations are in for two fuel oil storage tanks, of 10,000 and 15,000 gallons capacity respectively, and work on the tanks themselves will start shortly. In this connection it is interesting to note that the mill will burn oil only, using about 300 bbls. daily of diesel and fuel oil, in contrast to usual practice along the Columbia River of firing hogged fuel.

The plant will develop no power, but will buy about 4,000 h.p. from the Portland Electric Power Co., and will generate steam only for its process work. The steam plant will have three 500 h.p. boilers operating at 225 lbs.

Next month construction will be started on a 50,000 gallon elevated tank, 125 feet above the ground, for fire protection purposes.

The product to be manufactured is the result of about one and one-half year's study on the part of E. A. Millington and his son, C. A. Millington, the latter being actively in charge of the construction of the St. Helens plant. The Millingtons had a laboratory of their own in California and there it was that the product was evolved from experiments which began in July 1926.

In manufacture the wood waste from sawmills will be chipped, bark and all, and cooked in the rotary digesters with steam. After being softened the fibre bundles will be run through two hammer shredders then mixed with sizing and run upon a Beloit fourdrinier. Beloit is expected to ship the fourdrinier next month. This unit will trim 156 inches and have a wire 80 feet long.

Consistency of the stock going to the fourdrinier will be about that commonly run upon a paper machine. A mass about 1 1/4 inches will be built up on the wire, giving a finished product 7/16 of an inch thick. The finished board will be cut into sheets 4 feet wide and 8 and 12 feet long.

After the wire the sheet will pass through three main presses with 30 inch rolls and five pony presses with 20 inch rolls.

From the presses the sheet will enter a Coe dryer, the most massive piece of equipment in the plant. It is said to be the largest dryer of its type in the world. Coe expects to ship it early in January. The machine will weigh 1,250,000 lbs. and will be 365 feet long, 13 feet wide and have eight decks.

The capacity of the plant will be about 250,000 square feet daily.

The 20 principal pumps used in the mill are now being fabricated in the Portland shops of the Bingham Pump Co.

Three Nash vacuum pumps serve the fourdrinier.

The public utility will deliver power at the mill at 66,000 volts and Westinghouse transformers will step

this down to mill voltage. General Electric motors are specified for mill drives.

Several additions to mill staff have been made, or will be, soon. W. M. McIntyre will take up duties of master mechanic beginning the first of the year. He has known the elder Millington for 20 years. Paul Haas will have



C. A. MILLINGTON

is an active
figure on the
construction work
of the new
FIR-TEX INSULATING
BOARD CO.

charge of the machine and shredder rooms. R. W. Simeral will join the company January 1 as steam and electrical engineer. K. J. Carney is secretary-treasurer of the company.

Electro-Kold corporation is now using an insulating board made of wood fibre to replace cork board as insulation in domestic electric refrigerators manufactured in Spokane. Use of the new material was started December 1.

Nothing New On Backus-Brooks

While the Coast is holding its breath waiting to see what the Backus-Brooks interests of Minneapolis are going to do with the power rights they hold on the Cowlitz River in Washington, nothing official in the way of a statement has been forthcoming except a brief word from President E. W. Backus that the "reported expansion by one of our subsidiaries, The Insulite Company, is true and we are now investigating several sites on the Pacific Coast."

Backus-Brooks have in recent years sunk many thousands of dollars in preliminary engineering surveys on the Cowlitz, and apparently intend to make use of these studies soon. It is reported, but unconfirmed, that the company is ready to spend about \$18,000,000 in Pacific Coast development.

Stack Losses In Sulphate Mills

(Continued from page 40)

Conclusion

In conclusion it may be said that the system here described differs from others principally as to the quantity of gas filtered and therefore as to the size of the sample of solids obtained.

When a large quantity of gas is sampled the equipment becomes more cumbersome. A motor driven fan is used and the filter is made up of one or more large cloth bags of appropriate material. With such a set up the gas volume sampled is sometimes measured by a Pitot tube in the sample line, or the volume is not directly measured at all, but instead the velocity of gas entering the sample pipe is maintained at the velocity of the

flue gas by balancing the static pressures of the two streams. This method requires that the sample be drawn from the flue at a point of average velocity. The sample so obtained will then be that portion of the total that the area of the sample tube bears to the total flue area.

Where the two methods have been used together on the same flue, they have checked each other quite satisfactorily so that there is no preference between the two as to accuracy. The results to be obtained are probably correct within 5%. The gas meter method is preferred on account of its simplicity and compactness.

All Quiet On the Alaska Front

Although field engineers studying the power and timber possibilities in Alaska, looking toward the establishment of paper and pulp mills, have been south now for several weeks there is not an iota of news to be had from the executive offices of the two groups holding the pulp timber and power preliminary concessions up North.

J. D. Zellerbach, vice president of the Crown Zellerbach Corporation, who holds the preliminary permit in Allotment "B" with I. Zellerbach, simply reports that "there isn't a thing to say."

George T. Cameron, publisher of the San Francisco Chronicle, who holds Allotment "A" says only that "the data we have on the Alaska proposition is incomplete."

The Alaska Gold Mines Co., holds at Thane, Alaska, just three miles out of Juneau, an idle ore mill which is said to be admirably adopted for a paper mill site, and, further, which the Cameron interests are said to have been eyeing favorably. In response to questions concerning possible disposition of the Thane townsite for pulp and paper mill use, J. R. Dillon, treasurer of the Alaska Gold Mines Co., states, "from time to time people on the west coast have been interested in our Alaska properties, but no plans have ever materialized."

In a discussion of these two Alaska projects in the October 1929 number of PACIFIC PULP & PAPER INDUSTRY it was mentioned that the Thane townsite would probably be heavily considered because of the improvements in the way of buildings and docks already available and more particularly because the recent discovery of a new lake near Taku Inlet made available to Thane some very desirable and unexpected additional power.

In order to facilitate development of Alaska paper mills the U. S. Forest Service cooperates with the Federal Power Commission. The latter granted preliminary power permits on potential power sources to the Cameron and the Zellerbach interests on June 16, 1927. The grantees were to have two years to complete their preliminary studies. In June 1929 this time was extended one year more to June 16, 1930. Under the terms of the pulp timber awards a paper mill with a minimum capacity of 200 tons daily must be completed before April 1, 1932, or, in other words, within five years from the date of the award.

Cousins Moves Up A Notch

Dennis E. Cousins has been named general superintendent of the Tacoma kraft pulp mill of the Union Bag & Paper Power Corp. to succeed Joseph Hedin, resigned. Mr. Cousins was formerly assistant superintendent.

E. S. Osborn, for the past year resident manager of the Pacific Coast Supply Co. in San Francisco, has resigned to go with the San Francisco Community Chest. His successor has not yet been named.

The Substance of the Stuff We Sell*

By MINER CHIPMAN
Industrial Engineer, San Francisco

FOR more than twenty years I have been very close to the paper business. Every night I sleep beneath the comfortable warmth of a paper-mill felt. What wonderful blankets they are, too! Once upon a time these blankets were woven into the endless belt for the great machine back there in Maine. Paper-machine felts, like young men, must "go straight" or be set aside. The best blankets I possess are those made of a felt which refused to run its dutiful course and had to be discarded. The few short hours of existence on the machine, however, gave it the ineffable fragrance of the mill—memories of stately pine, and rushing streams; the rising of steam from giant funnels on zero mornings in December—a mystic, magic something bringing dreams of men I knew, the days I lived, in that far-off, long ago.

It is nearly twenty years ago since that day in December that I stepped off the train at Westbrook, Maine. Joe Warren met me at the depot. I was the "efficiency expert" come to standardize the mill. Yes, I really thought I would—or could. Ignorance is a wonderful thing—the mother of courage and the father of valor. I sometimes wonder, after this lapse of years, just why the memories of those Cumberland days remain with me undimmed by the new adventures of life. I am sure that it was the romance of paper—the men who make it—and the loveliness of the thing they make.

Proud of His Efficiency

Being a man distinguished for scientific research—an "efficiency" expert, knowing all—I had to start in my standardizing process at the beginning of the paper-making process. I discovered that the origin of the paper was in a gigantic woodpile back of the mill. I had always had a distinct aversion to woodpiles, but when one becomes an "efficiency" expert, it becomes a delightful occupation to standardize one's pet aversions. My father had learned, years before, that I was an efficiency expert in avoiding a particular woodpile. And so it came to pass, that the expert came to Cumberland Mills, and put his crew of stop-watch experts to work in a scientific, accurate, exhaustive, and painstaking study of the woodpile. We timed everything to the 1-100th of a minute, we made an accurate record of every move and every operation. Nothing escaped our scientific observation. We counted the men, we ascertained their ages, we counted the sticks of wood, we counted the cars, we counted everything. We weighed the wedges and the sledges, the car-loads, and the cars—we knew everything that an efficiency expert should know. Then I wrote my great report.

I found that the average age of the workmen on that woodpile was above sixty. We had discovered that these workmen had built for themselves a lean-to or

shack, hidden away in the hugh woodpile—where they would sit and smoke, and play checkers. We counted the minutes spent in lighting pipes, and the hours wasted over these stolen checker games. We computed with great accuracy the Man-Hour-Work to be done, and the Man-Hour Work actually done. I pointed out that the efficiency of the work done on this woodpile was between 33% and 33.65%, and that the cost of doing that work could be cut to the extent of \$15,674.52 per annum. I had all the evidence, all the facts—tabulated, arranged, logically and convincingly. There was nothing to it. My woodpile report justified my existence.

When the report was finished and neatly bound, I sent it to the Mill Manager.

The Summons

I waited several days for a response to my letter submitting my initial report. None came. A few days later Joseph A. Warren, the Mill Manager, told me that my report had been handed to his father, the Factor of S. D. Warren Company, who assumed full responsibility for the operations of the great woodpile. Finally I received a telephone message that Mr. John E. Warren wished to see me. At last, I thought, my report has received recognition. I raced down to the executive offices. I was ushered into Mr. Warren's private office. "Sit down!" he said.

He seemed to be busily engaged in some work before him. He kept me waiting. I did not like it. The importance of my woodpile report was bearing heavily upon my mind—why this delay? At last he looked up, and said to me: "You are the Efficiency Expert, are you not?" "I am, yes sir," I replied.

Splitting Hairs

"You apply scientific methods of management, do you not?" he continued. "Yes, sir, we study industrial operations with a stop-watch to the one-hundredth of one minute." Then I went on and gave a long-winded lecture on the scientific accuracy of scientific management. I told him what a wonderful thing Efficiency was—and how desirable a thing it was to possess. I told him a lot of things. He listened attentively—John E. Warren was a gentleman. His fine attention gave me courage and added to my flow of efficiency-eloquence. When I had finished he said, very quietly:

"I see. You are very scientific in your observations. You are painstaking in your investigations, and overlook no important or vital factor." "No, sir, Mr. Warren," I replied with fervor, "we overlook absolutely nothing essential. You see, Mr. Warren, we start at the foundation, and by careful observation and analysis we ascertain the underlying principles, and scientifically set up standards of performance. . . ."

"Now this report on the woodpile. Am I to under-

*From an address delivered by Mr. Chipman at a convention of the sales managers of the Zellerbach Paper Company.

stand that this report is representative of your scientific observations?" "Yes, sir," I replied. "It is a demonstration of the scientific thoroughness of Modern Management!"

"I see," he said, "that you have counted the number of men, the number of sticks of wood per man, the number of cars per day, etc., etc. I see that you have computed the average age of the workmen. I see that you have scientifically determined that these men are about 16½% efficient. I see that you recommend that we discharge the whole gang and employ new men. You say that five good men could do the work of the 17 men now employed. Is that right?" "Yes, sir, that is what I recommend, Mr. Warren."

"And this report, I would take it, covers all the details, all the vital information required to warrant such drastic changes." "Yes, sir, you will find copies of all our time-studies in the back of the report—all the data is there, Mr. Warren!"

"I have read the report very carefully. Yet I have failed utterly to find what I consider very essential and important information." "I do not understand, Mr. Warren. What is lacking?"

Not Everything

"Young man," he said, "do you know exactly who those men are who are working on that woodpile?" "Why certainly—there is a list of them. Every man is listed, his name, address, age, how long he has worked for the firm, and everything."

"No," said Mr. Warren, "not everything. This report does not say a word about the really important factor concerning the men on that woodpile." "What is that?" I asked—with a new sense of fear creeping into my consciousness.

"You are not aware, apparently—and you made no effort to find out—scientifically or otherwise—you have not discovered, to say the least, that every blessed man working on that woodpile is a PENSIONER." "A what?" I fairly shouted.

A Lecture

"A pensioner, I said," continued the Factor, "a pensioner—who, having worked for S. D. Warren Co. for 30 years, is entitled to full pay—whether he works or not. You do not know, apparently—why those men are there. I have my own notions of efficiency—perhaps they are notions of an old man—an old fogey—who does not understand these new-fangled scientific methods. But I have a notion—that if we turned those old, faithful fellows out of that wood-yard—told them to stay home—because they were not EFFICIENT—I am afraid, young man, that we would be carrying them off to the graveyard on the hill within sixty days. Let me tell you something—something you never heard about, or read about in your efficiency books. . . . When a man has worked in a mill for thirty years—every day excepting Sundays, rain or shine—and his wife has packed up his lunch-basket—and he has gone to work whistling and the years pass, and old age comes creeping on to him—gradually—and slowly—and the time comes when younger men must take his place at the big machines—Young man—then comes the test of management. The old man's son—maybe his grandson is doing the pushing. And men have pride—in themselves, in their work—in the life that is left in them—and when the call comes in the morning—and the hands start drifting toward the mill—and mother has packed that lunch-basket—suppose it wasn't for him—that call? Let me tell you something—the happiness of those old-inefficient men on the woodpile—keeps the mill running. Our people know that we take care of

them. We don't shovel them out of the industry because they are old. And let me tell you another thing: as long as I am alive—so long as I am Factor of this mill—I'm going to have a place for the boys—somewhere—efficiency or no efficiency . . . and that's that!"

I was beaten, I was ashamed. But I had made a great discovery. I had found out that there is something more to Efficiency than machines, and stop-watches, and scientific methods. I found that the human heart—has a place in the world of big business—and that that principle—running all through the organization of S. D. Warren Company—was expressed in the substance of the stuff they sold.

Shipments Via Canal and River

The United States government is beginning to get seriously interested in the possibility of shipping Pacific Northwest pulp and paper products to the Gulf States and the reaches of the Mississippi River.

Col. Thomas Esty of San Francisco, Pacific Coast representative of the Mississippi-Warrior Service, the federal government barge line operating out of New Orleans, in the course of a visit to the Pacific Northwest last month expressed optimism at securing better rates via this route that would be attractive to Pacific Coast pulp mills in reaching the paper mills of the Ohio River region.

At present the Coast mills are getting into Midwest territory on an all-rail rate of \$12 and \$13 per ton. There are some advantages in all-rail shipment which at the present weigh heavily over the Canal-River route.

In the first place the pulp shipper can load his car right at his mill door and that car goes right straight through to the door of the purchasing paper mill. No more handling. No intermediate trucking or short haul charges.

But perhaps even more in favor of the all-rail shipment is the delivery time of about nine days as compared to 40 to 50 days on the long way around by water. This factor, brought down to the balance sheet, means that on a 100-ton shipment of pulp worth \$50 per ton an inventory of \$5000 is tied up, earning nothing.

Any all-water rate to be attractive must offset the present advantages of quick and fairly low cost delivery now afforded by the railroads.

Another point of attack is news print. There is some feeling that Pacific Coast news print could get into Southwest territory via this all-water route. A considerable tonnage of news print is now moving from Pacific Coast mills to Texas and other parts of the Southwest. The river route, it is believed, would at least make accessible those cities along the river which are able to take advantage of direct barge service. The South, of course, produces no news print for itself and must rely for its supplies mainly upon the news mills of the Northeastern states and Eastern Canada.

Interested shippers are looking into the problem in aggressive fashion. Establishment of favorable rates would have an important bearing on enlarging the news market for Pacific Coast mills.

Behrend Inspects Hoquiam Plant

President E. R. Behrend of the Hammermill Paper Co., Erie, Pa., was a visitor to the Pacific Coast in November and spent several days inspecting the new pulp and paper mill of the Grays Harbor Pulp & Paper Co., Hoquiam, Wash., in which the Hammermill company holds a substantial interest.

Woodlands Section Will Make Pulpwood Study

The Woodlands Section of the American Paper & Pulp Association is about to undertake a regional study of pulpwood forestry. The focal point of the study will be costs, so that technical factors can be interpreted with a common denominator by mill executives in planning business policies. Actually, the study will be one of present timber supplies and future forestry.

Charles W. Boyce, secretary-forester of the Woodlands Section, in announcing the proposed study said: "Technical advance which is making possible the use of new pulpwoods has opened wide the whole question of costs. Intense competition is forcing a regional reallocation of the industry, in which wood costs are a deciding element."

The preliminary announcement points how pulpwood costs and distribution costs are closely related. Wide variation in wood costs, ranging from \$5 a cord in the newer and more favored regions to \$24 a cord in such intensely developed regions as New England, amounts to a differential of \$24 per ton of chemical pulp, a differential that is still a serious handicap despite the higher distribution costs of the mills farther removed from the market centers.

Four Choices

Mill control of raw material, Mr. Boyce points out, is now recognized as necessary to sustained, permanent operation. This involves forestry and future pulpwood costs. The introduction to the proposed Woodlands Section Study of Regional Pulpwood Costs recognizes the possibility of other materials competing with wood as pulping raw materials, but, assuming that pulpwood can continue to compete successfully as a paper making material, it suggests four major alternatives from which a wood-pressed company in the Northwest may have to choose. They are:

- (a) Discontinuing pulp mill and continuing paper mill on purchased wood pulp, either imported or domestic;
- (b) Discontinuing pulp mill and continuing paper mill, but depending upon a company owned pulp mill in a new forest region.
- (c) Building up in the present region a vertically integrated industry from ownership of sufficient forest land to meet mill requirements to the final production and distribution of paper;
- (d) Complete shut-down when competition is no longer possible.

In New Regions

Mills in new regions are faced with the necessity of determining their chances in regional competition. This resolves itself largely into a consideration of present supplies and prices of pulpwood and future costs of pulpwood and methods of obtaining it, as compared with other regions. These mills must decide between:

- (a) The purchase and management of sufficient forest land to meet mill requirements on the basis of round wood;
- (b) The purchase and management of sufficient forest land to meet mill requirements if forest production is regulated to produce products other than pulpwood, the pulp mill requirements being met by thinnings and waste;
- (c) The purchase and management of enough forest land to serve as a reserve to supplement in times of stress the purchase of pulpwood from other forest owners.
- (d) The complete dependence upon purchased wood.

It is with the idea in mind of giving the industry some tangible figures on which to work out future policies with respect to pulpwood supplies that the Woodlands Section is undertaking its study. The study will be conducted by committees of foresters in each region. Wherever possible preliminary meetings will be held at which the secretary will explain the purpose of the study and the type of information desired.

Regional reports will cover, in two sections, the present and immediate future, and the more distant future.

The first discussion will be largely a discussion of present pulpwood costs at the mill. The second will be a discussion of the regional costs of growing pulpwood under two conditions:

- (a) On a short rotation with round pulpwood as the final product;
- (b) On a long rotation, the final product being material of a higher quality than pulpwood; the pulpwood being obtained from thinnings and waste from other types of wood manufacture.

Denies Everett Mill Rumor

According to E. M. Mills, executive vice-president of the Crown Zellerbach Corporation, who was in Seattle late in November enroute to San Francisco, following an extended visit to eastern cities, there is nothing to the rather persistent rumor that this corporation and its more or less allied organizations are at present contemplating the building of a new pulp or paper mill at Everett, Wash. Mr. Mills has been a leading figure in all new construction undertaken by the Zellerbach group in the Pacific Northwest in the past few years.

The rumors were apparently based on a report that the Zellerbach interests had acquired a site in Everett and had taken an option on the Ebey Logging railroad which, it is said, is capable of tapping some fine pulp timber. Other reports were current that plans were well along for a new mill, but these reports met with no confirmation.

The fact that the International Wood & Sulphite Co. has recently completed a large modern wood chipping plant adjoining the Canyon Lumber Co. sawmill gave some color to the rumor, since the International company has a principal customer in the several Zellerbach mills in Western Washington.

Still another factor for the rumor is the memory lingering with Everett citizens that hope of securing such a pulp mill was one of the considerations in approving a bond issue last summer with which to build a new and adequate industrial water line.

Van Alstyne Quits Vancouver

J. W. Van Alstyne, in charge of the sulphite pulp mill at the Columbia River Paper Mills, Vancouver, Washington, for the past four years, resigned last month. Mr. Van Alstyne, who has not announced his future plans, is succeeded by E. A. Weber, who also retains his connection with the Oregon Pulp & Paper Co., at Salem, Oregon. It is understood that Mr. Weber will divide his time as chemical mill superintendent between the two plants.

Ben M. Doolittle, who has been in charge of the general improvement program at the Vancouver Kraft Mills, Ltd., Port Mellon, Howe Sound, in British Columbia, has been transferred to the Columbia River Paper Mills as engineer in charge of maintenance. Until coming north a few months ago Mr. Doolittle was superintendent of Leadbetter's Los Angeles mill, the California-Oregon Paper Co.

Powell Employee Cited for Bravery

Charles Bird, employe of the Powell River Company, was recently presented with the bronze medal of the Royal Canadian Humane Society for bravery in attempting the rescue of a man from drowning in Malaspina Strait, B. C. The presentation was made in behalf of the society by R. Bell-Irving, mill manager. On three previous occasions at Powell River and elsewhere Charlie Bird took part in rescue attempts of a similar nature.



The ancient Arabs brought the paper maker's art from China.

Proposes De-Inking Plant at Vancouver

Providing that sufficient financial backing is obtained, a ten ton mill will be built in Vancouver for the purpose of converting waste paper into paper pulp.

The project is backed by United Financial Brokers, Ltd., 501 Rogers Building, the managing director of which, Ernest T. McGregor, is the inventor of the pulp conversion process.

Mr. McGregor, who has obtained patents in Canada and the United States, claims that his machine will cheaply and effectively remove all trace of ink and color from paper. He has already established a small testing laboratory and has there produced various types of paper from old newsprint, magazine and other paper waste.

The pulp has been tested and pronounced satisfactory by eminent chemical engineers, says Mr. McGregor, including Arthur D. Little, Inc. of Cambridge, Mass., and the research department of the University of Washington.

May Develop Prince George Power

Sponsors of the Prince George pulp and paper mill project are being asked by Prince George interests to investigate the possibility of harnessing the power resources of the Salmon and Willow rivers instead of the Nechako river, which is a navigable stream at present and offers possibilities of becoming an important artery for steamboat and log traffic when the Stuart Lake country is sufficiently developed.

T - A - P - P - I

Pacific Coast Section

Plans are now fairly well along for the spring meeting of the Pacific Coast Section of TAPPI to be held in Longview on Saturday, April 5, 1930. It is tentatively proposed to discuss administration affairs in the morning and to hear technical papers in the afternoon. A business session will be held at 11:30 a. m., just before the noon adjournment.

In the meantime Chairman Robert S. Wertheimer, resident manager of the Longview Fibre Co., has announced the appointment of two important committees as follows:

PROGRAM AND PUBLICITY

A. H. Hooker, Hooker Electrochemical Co., Tacoma, Wn.
L. R. Wood, Union Bag & Paper Power Corp., Tacoma.
R. Reid, St. Helens Pulp & Paper Co., St. Helens, Ore.
I. H. Andrews, Powell River Co., Ltd., Powell River, B. C.

MEMBERSHIP

Sigurd Norman, Spaulding Pulp & Paper Co., Newburg, Ore., chairman.

E. P. Ketchum, Powell River Co., Ltd., Powell River, B. C.
Myron W. Black, Inland Empire Paper Co., Millwood, Wn.

The ladies will be welcome. Because of the number present at the first fall meeting held in Tacoma last October it has been decided to arrange a special program of excursions and entertainment for the ladies at the spring meeting.

The meeting will conclude with a banquet.

The City of Longview is welcoming the opportunity to play host to the Coast technical organization.

It is now quite definitely decided that Dr. H. K. Benson, head of the chemistry department at the University of Washington, Seattle, secretary of the Pacific Coast Section, will attend the annual meeting of TAPPI to be held in New York February 18-20, to confer at that time with the executive committee of the national body.

Crown Reforesting 1400 Acres

Reforestation operations are being started on the upper Youngs river, in Northwestern Oregon, this month by the Crown-Willamette Paper Co. Chester J. Vincent is in charge of the work and has a crew of from 20 to 50 men at work.

About 600,000 young trees, mostly spruce, will be planted on about 1400 acres. This will bring the company's reforested area to about 6000 acres for the past three years. This year's work and that of coming years will be devoted to reforesting land that was cut over during the preceding year. The company last year caught up with its logging operations in reforestation work.

Forest Fire and Other Verse

Maj. John D. Guthrie, of the U. S. Forest Service, Portland, has collected and edited "Forest Fire and Other Verse" which was published December 1 by Dunham Printing Co., 116 Second St., Portland.

The work is an anthology of forest ranger verse, the second collection by Maj. Guthrie. It contains verses by and about forest rangers, foresters, and forestry work. It abounds in humor, pathos, feeling and outdoor beauty. It is a valuable contribution to American forestry verse and forest folk-songs. A good volume to have in the library when business cares get too heavy.

In the 346 pages of the cloth bound edition 149 different authors are represented. Postpaid, \$2.50.

Mural Paintings For Crown Zellerbach Building

Samarkand, that city of colorful history and romantic associations, was the gateway through which the manufacture of paper found its way from China to the rest of the world. When the Arabs captured this ancient city they found the Chinese were making paper. They made them captives and took them along with their equipment to Bagdad, where they introduced the making of paper, and it spread later throughout Persia.

The mural painting reproduced in this issue shows the people of ancient Bagdad making paper in the crude manner then known. The panel shows the open vat in which the pulp was macerated, the crude hand press then used, and the manner in which they dried the finished sheets. This is the central panel on the wall of the board room of the Crown Zellerbach Building in San Francisco, for which Warren Chase Merritt is painting ten beautiful murals depicting the growth of paper making as the knowledge of it spread throughout the then civilized world.

In the Eleventh Century the Moorish invasion brought the idea of paper making into Spain. This phase in the history of paper making is illustrated by the other reproduction of the oil painting. In this Mr. Merritt has pictured the Spanish nobleman examining some of the first paper made in Toledo, Spain. Historians credit the Chinese with having made paper long before the development of papyrus by the Egyptians. The Chinese kept the art of paper making a secret for over six hundred years, until the invasion by the Arabs.

Paraffine Is A Steady Earner

Net income of the Paraffine Companies, Inc., has more than doubled in the five years to June 30, 1929. A statement for the quarter ending September 30, 1929, shows a 10% improvement in earnings as compared to the same period in 1928. Diversity of manufactures and the growth of export business contribute to the steadily increasing earnings.

The company opened an export office in London last spring and President R. S. Shainwald is quoted as saying that certain of the company's manufactures can compete successfully in the Eastern and the European markets due to the greater efficiency of the company's manufacturing equipment.

For the year ended June 30, 1929, Paraffine Cos., Inc., reported a net income of \$2,863,258, equivalent to \$6.25 per share, an increase of 16% from the net of \$2,464,476 for the year ended June 30, 1928.

Major items tending to increase earnings accomplished during the current year include expenditure of \$2,750,000 in improvement of the company's wholly owned plants and its semi-owned subsidiary, Fibre-board Products Inc., and the acquisition thru exchange of stock of the Cott-a-Lap Co. of Somerville, N. J.

Paraffine balance sheet as of June 30, 1929, shows total assets exceeding \$17,000,000, which includes directly owned properties and investments in other companies. Current assets stand at \$4,034,178 and current liabilities at \$1,028,662.

Canadians Seek Higher Machinery Duty

Canadian manufacturers are seeking an increase in the duty on American pulp and paper making machinery. Protests that at least one British Columbia pulp and



The Spanish have known paper making for centuries.

paper company has been buying machinery in the United States when it could just as well buy in Canada have been lodged at Ottawa before the tariff advisory board. Chief spokesman for the complainants was E. Davies of the Vancouver Engineering Works, who read a brief from the Canadian Sumner Iron Works asking for an increase in the rate for sawmill and pulp and paper mill machinery.

Mr. Davies' argument was that most of the British Columbia mills that had bought their machinery in the United States were owned by United States capitalists. He claimed that in some cases the purchases had been made in the United States despite the fact that Canadian firms had filed lower bids.

Wendell B. Farris, representing lumber and paper manufacturers of Vancouver, stated that the industries had to sell in world markets and could not compete successfully with mills in other countries if they were compelled to meet a higher tariff schedule.

EDITORIAL

For A Reapportioning of Research

A chief contributing factor to waste in the forest industries is a lack of research study that will point the way to commercial markets. Pacific Coast woods have been particularly handicapped because the West is a newer country. It also suffers by reason of its geographical separation from other population centers of the country.

From the standpoint of national economy, however, there is a point that can not be slighted. The Pacific Coast area contains the nation's greatest remaining stands of timber. It is important to the Pacific Coast and to the nation as a whole that the greatest revenue possible be derived in the harvesting of these timber stands. Present methods of utilization do not bring that revenue. Better methods await the help of research.

The United States government has established at Madison, Wisconsin, a Forest Products Laboratory, the primary function of which is to study the tree species of the country with a view toward their most profitable commercial utilization; in other words, to conserve the nation's forests through proper utilization. It seems, therefore, in line to suggest that the Madison laboratory can justifiably devote a liberal portion of its time and funds to the study of Pacific Coast woods. This statement is made in view of the relative importance and value of the Pacific Coast timber stands with respect to the nation as a whole and the increasing use of these stands to satisfy national demands for wood pulp and lumber.

Particularly has the exceedingly rapid development of the wood pulp industry on the Pacific Coast in the past three or four years served to upset balances previously existing. What might have been a fair rationing of the Forest Products Laboratory's funds, time and facilities a half decade ago is decidedly out of proportion today. And that disproportion increases constantly and rapidly as the nation looks more and more to the Pacific Northwest for tomorrow's pulp material.

Conceding this general trend toward the Pacific Coast and the attendant logic of recognizing the trend with greatly widened research, PACIFIC PULP & PAPER INDUSTRY calls attention to the following state of affairs.

Upon being questioned what research work had been done, was now being carried out, or was on the program for the immediate future the Forest Products Laboratory gave this answer:

Recently, also, there has been a tendency on the part of Congress to appropriate moneys for specific projects, as, for example, the production of strong white paper from southern woods. This has resulted in a more intensive study of these species and *postponement of work on wood from other sections.*

The italics are our own.

There is no fault to find with the doing of special work where regional groups have had the initiative to secure special appropriations from Congress, but it is difficult to understand why any special job, fortified with special moneys, should in any way retard the natural order of work being carried out for the forest industries as a whole. Regions other than those for which the special appropriation have been made become in this instance the injured innocent bystanders.

In fairness, this further statement from the Laboratory must be given:

Plans for the next fiscal year are not yet made and will depend upon the appropriations made by Congress, and whether or not allocated to specific projects. The Laboratory and the Forest Service fully realize the desirability of more intensive pulping work on western species and recommendations in this regard will undoubtedly be made to the Bureau of the Budget.

Some preliminary sounding out of opinion reveals a ready willingness to support a move for a special appropriation for further and immediate research on Pacific Coast woods. Congress is in session now. It is time to get busy.

ELSEWHERE

The Kreuger & Toll merger has augmented its Swedish Cellulose Co. with the purchase of an eleventh mill, Sundsvalls Cellulose Co., which gives the merger another 35,000 tons capacity and a 32 per cent control of the Swedish pulp industry.

* * *

Mersey Paper Co. soon to begin production in new plant near Liverpool, Nova Scotia.

* * *

New England Power Association, controlled by International Hydro-Electric System, a division of International Paper & Power Co., is spending \$42,000,000 for construction in 1929 and 1930.

Maine Seaboard Paper Co., under same management as Cushnoc Paper Corp., Walter S. Wyman, president, has begun construction on new complete news print mill at Bucksport, Maine, and will install two 228-inch, 135-ton machines. Production to begin fall of 1930. George F. Hardy is engineer.

* * *

U. S. Envelope Co. purchases Consumers Boxboard and Paper Co. mill at Lititz, Pa., and will operate as Morgan Paper Co. Division to make tissue, marking first entry of company into paper manufacturing.

* * *

International Paper Co. negotiating with the New Brunswick province and may build new pulp mill at Chatham, N. B., in 1930.

* * *

Price Bros. mill at Riverbend, Canada, now has 400-ton capacity with a second machine going into production last month.

* * *

Consolidated Water Power & Paper Co. of Wisconsin has gone off of straight news print production and now produces book and bond papers.

* * *

Brown Paper Mill Co. will increase its Monroe, La., mill from 175 tons to 400 tons.

* * *

Nekoosa Edwards Paper Co., Wisconsin, is gradually working into the higher grades of kraft and away from the crowded low grades.

* * *

Smith Paper Co. of Lee, Mass., has placed a third machine in operation on high grade specialties.

* * *

The Beauharnois Light, Heat and Power Co. has begun construction on a 2,000,000 h.p. hydro-electric project on the St. Lawrence river near Montreal.

Zellerbach Sales Managers In Conference

"Educating the Salesmen" was the theme of the third annual sales managers conference of the Zellerbach Paper Co. and subsidiary and affiliated companies of the Crown Zellerbach Corporation held in San Francisco December 2, 3 and 4.

I. Zellerbach, president of the Crown Zellerbach Corporation, opened the meeting with an address of welcome and was followed by M. R. Higgins, who told the delegates "How to Get the Best Out of the Conference." Mason B. Olmsted summed up "The Year's Activities in Sales Promotion" and R. A. McDonald discussed the "Sales Policy of the Crown Willamette Paper Co."

The several morning and afternoon sessions were devoted to such basic topics as "Wrapping Paper Problems", "Sales Methods for Printing Papers", "Future of the Stationery and Notion Business" and "Promoting the Sale of Specialties in Various Lines."

During the wrapping paper session H. L. Zellerbach, G. J. Ticoulat, R. C. Clark and J. L. Taylor discussed such phases as chain store business, methods of meeting competition and new uses of paper and board in connection with packing fruit and vegetables.

Gordon Murphy, O. C. Sayles, James Igstadter, L. L. Larimer and James Nisbet were headliners on the printing paper session and took up such topics as the learning of new uses, studying the customer's needs and cashing in on advertising programs.

The personnel of the conference follows:

Zellerbach Paper Company Divisions

LOS ANGELES Victor E. Hecht Clem Reis Ernest Ferris	OAKLAND J. C. Ady A. E. Clark	In Attendance Subject to Call Leo Schoenfeld Fred Breyman Milton Colton Fred Mohler J. A. Enquist Sumner Caldwell P. H. Anderson Fred Ogden Martin Levy Philo Hollard A. G. Farrell
SACRAMENTO W. H. Williams	SAN DIEGO W. H. Clarke	
STOCKTON J. L. Taylor	SALT LAKE CITY James Nisbet Wm. P. Lambert A. M. Bain	HEADQUARTERS Delegates H. L. Zellerbach D. C. McMillin L. A. Colton R. C. Ayres M. B. Olmsted T. J. Finerty S. L. Leavick E. A. Breyman L. L. Larimer R. W. Parkinson
SPOKANE F. A. Stockwell	SEATTLE Alvin R. Kuhn Frank Hansen	
EUGENE Z. N. Agee	SAN FRANCISCO Delegates F. C. Stratford James Igstadter Jess W. Knapp T. C. Maccormack A. W. Akers	In Attendance Subject to Call J. C. McCrary Fred Morgan A. L. Bennett
PORTLAND O. C. Sayles Walter R. McWaters		
SAN JOSE L. J. Marymont	Second Street Division Gordon Murphy	
FRESNO Robert C. Clark C. E. Carlson		
Crown Willamette Paper Company R. A. McDonald G. J. Ticoulat G. E. Young	National Paper Products Company The Sanitary Products Corporation L. J. Arms Fibreboard Products, Inc. W. H. Thomas E. J. Farina O. C. Majors W. J. Kelley W. D. Heller M. R. Baruh	
Western Waxed Paper Company Andrew J. Christ, Jr. J. W. Pigman W. W. Dresser		

International Paper Co. Assets

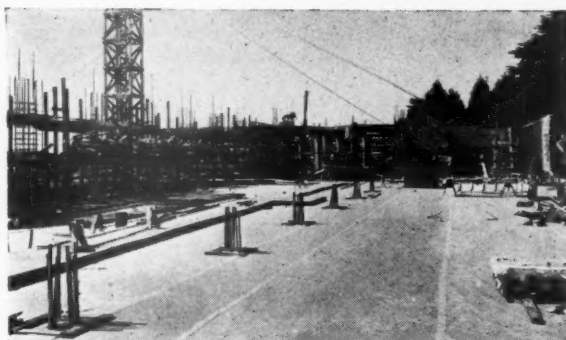
The consolidated net current assets of International Paper and Power Company on September 30 amounted to \$50,875,000.

The gross current assets were \$75,461,000 against which there stood current liabilities of \$24,586,000, these latter comprising only ordinary accounts payable and accruals of interest and dividends, all bank debts of the company and of all its subsidiaries having been paid off.

Paper Used for Curing Concrete

Building contractors commonly cover newly laid concrete with a layer of sand which is kept moist during the curing process. This method has disadvantages in cost of securing, placing and subsequently removing the sand, and in the layer of dust which becomes ingrained in the green concrete and remains a nuisance for a long time after the concrete is opened to traffic.

In more recent construction the sand is replaced with paper. Sisalkraft, a tough, reinforced, waterproof sheet



In building Giannini Hall at the University of California some 300,000 sq. ft. of Sisalkraft paper were used to protect the concrete while it cured. Here is shown the method of application.

has been employed extensively on some of the major construction jobs recently in the San Francisco area.

The development of Sisalkraft, with strength sufficient to withstand the abuse to which it is subjected on concrete floors, makes possible an improvement in this method of curing. By simply unrolling the Sisalkraft over the concrete floors, a waterproof and airproof cover is provided which prevents the rapid escape of moisture from the concrete and protects the surface from dripping cement and construction dust of all kinds until the building is completed. The accompanying photograph shows typical application of this paper for curing floors in big buildings.

The desirability of clean, hard, dustless concrete is not limited however to skyscrapers. There is every reason for securing these qualities in the basement floor in a bungalow, the floor of a garage, the corridor of a school building, or anywhere else that concrete is used. The action of concrete in the curing process is just the same whether it is laid in a basement floor or a skyscraper.

The protection of concrete from dust, oil, grease and cement during construction is perhaps even more important in small buildings than the curing of the concrete. The basement floor—and in fact almost any floor—is subjected to the dripping and the dust resulting from all the operations in construction after the floor is laid.

Crown Zellerbach Pays Dividend

Directors of Crown Zellerbach Corporation at a meeting on November 30 declared the regular quarterly dividend of 25c per share on the common stock payable January 15, 1930, to stockholders of record December 31, 1929.

Silliman Goes to Empire

A. C. Silliman, formerly with the Spaulding Pulp & Paper Co., is now at Empire, Oregon, with the new Sitka Spruce Pulp & Paper Co. 50-ton sulphite pulp mill.

T·R·A·D·E - T·A·L·K

Devoted to the Paper Trade of the Western States

Kahn Says Business Is Good

Business conditions averages in the paper trade in the west are just about the same as the averages throughout the nation, says Charles Kahn, San Francisco, secretary of the Pacific States Paper Trade Association. The Pacific States association has been compiling the business averages from its members since last August and has sent them on to the National Paper Trade Association, which has published them in its confidential bulletin along with its own national averages. The west and national figures are very close, Mr. Kahn says.

Business in the paper trade in the west is good, Mr. Kahn says, judging from the averages submitted and from his general observations. He believes that the recent stock market slump will have absolutely no effect on the paper business and, in general, it will cause everybody to get back to work and stop playing the market.

Denver Firm Making New Style of Paper Caps

Football crowds in the Rocky Mountain Conference have taken on a more gaudy appearance since the trench caps made by Carter, Rice and Carpenter have made their debut. The caps, designed by a member of the firm, very closely resemble the cap of the French soldier, with its half moon effect. They are made of 65 lb. antique cover paper, thus actually providing a real head covering for outdoor wear. They are printed in two colors, alternating the base color and the lettering so that men and women will be sporting the same colors and yet have different designs. Large firms have purchased the caps by the thousands this fall and presented them to students as an advertising feature.

IF I WERE A PAPER SALESMAN—

I would constantly seek to learn all I could of those things that bordered on my immediate job of selling paper. I would make acquaintances with practical printers and engravers and build up my knowledge of the fundamentals in these arts which use paper that I might understand their language and better service them with papers built for specific needs. I would miss no opportunities to visit pulp and paper mills that I might learn the fundamentals here also, that I might broaden myself through the advantage of being able to look at the paper jobber from the mill man's viewpoint. In other words, if I were to sell paper, I would want to know all there is about the products, from the tree in the forest or rag in the bale to the printed piece or the wrapped package.—Thought suggested by E. A. D.

Paper Jobbers to Meet in Denver

A meeting of all paper jobbers in Colorado will be held at the Brown Palace Hotel on December 16 in Denver. The foremost speaker of the gathering will be Frank Lloyd, secretary of the National Paper Trades Association, who is making the trip from New York especially for this meeting.

Seattle Is Bowling Along

Seattle is represented in the Benjamin Franklin bowling league with teams from three of the jobbing houses. Every Monday night the boys do down and knock the pins over. They say that Carter, Rice & Co. has been pushing over the most of them while Zellerbach Paper Co. hasn't—well, they haven't quite found their stride.

The teams are as follows:

CARTER, RICE & CO.—Goerge A. Smith, A. Lundin, E. Lundin, W. K. Phelan, and S. J. Harrod.

ZELLERBACH PAPER CO.—Charlie Keppler, Zirwes, Jim Milne, "Knut" Rocke, and Caldwell.

BLAKE, MOFFITT & TOWNE—J. H. Leatherman, Ed. Moulton, Jim Whitelaw, George Brown and Frank Carson.

Caslon Bond Using Direct Mail Pieces

The Seattle branch of Carter, Rice & Co. is sending out a series of attractive direct mail pieces featuring Caslon bond, manufactured by the Munising Paper Co. Many of these pieces use a theme that smacks of romance, of the days of sailing ships and pirates bold. Color, vivid tones, play an important part in these broadsides.

Carter, Rice is also featuring a fine piece of work from Martin Cantine Co., which effectively uses the increasingly popular water color printing.

Seattle Jobbers See Business Good

If the crash in the stock market shook a lot of territory it failed to reach as far as the Pacific Northwest if one may judge by its effect on the paper business. Everything seems to be running along in normal fashion. For the first two or three weeks after the big 16,000,000 share day the credit men may have squirmed a bit uneasily seeking the right path to pursue, but even that's over with.

"The year has been a bit peculiar," remarks J. C. Whitelaw, sales manager of the Seattle branch of Blake, Moffitt & Towne. "When we finally check up we will perhaps find ourselves with less volume for the year, but with a better profit. And that's really a good sign."

Charles Beckwith, manager of the Seattle division of Carter, Rice & Co., reports no effects from the stock market debacle. "Everybody seems to be buying as usual. After all, only a small percent of the population was mixed up in the market, anyway."

Western Paper Company Pushing New Lines

The Denver branch of the Western Paper Co. has moved into new quarters though still remaining on the same floor of the Chamber of Commerce Building. The new rooms are 514-516. New lines which the firm has been pushing this fall are the Collins Moderne Book and Translucent Brochure Book. Another new paper meeting with success is the Silver State Venetian bond of handmade finished commercial announcements.

New Paper Men in Rocky Mountain Region

Two of the largest paper firms in the region have made announcement of additions to their sales forces. Carter, Rice and Carpenter announce that N. E. Dodd, formerly with the American Type Founders Company and an experienced newspaper man, took over representation for the company in Wyoming on December 1. The Butler Paper Co. announces the addition of C. H. Moore, formerly associated with the Smith-Brooks Printing Co., to the sales force.

Hold Exhibit of Warren Papers

Carter, Rice and Carpenter, Rocky Mountain distributors for Warrens Papers, were hosts to approximately 80 printers on November 7 at the Oxford Hotel in Denver. Following a dinner the guests heard talks by Earl Bowman and Clark Weymouth of the Warren Co. and viewed the exhibit of Warrens Papers.

Will Show Paper Mill Movie

The Seattle branch of Blake, Moffitt & Towne expects to get the industrial movie taken in the mill of the Oxford Paper Co. some time this month. It will be shown before groups of printers and others interested in paper. The film has been shown with great success in California cities where Blake, Moffitt & Towne has branches.

B. M. & T. Will Rally 'round the Table

Everybody in the Seattle branch of Blake, Moffitt & Towne is looking forward to the last week of the year when the branch will hold its customary annual banquet and get-together. The road salesmen will all be in at that time and there will be some conferences. Also, a measure of overtime for all hands in taking inventory.

Annual Sales Dinner Held by Butler Office

The Denver office of the Butler Paper Co. held a dinner and get-together for all members of the sales force on November 29 at the Oxford Hotel. Every member of the force gave a short talk on his suggestions for the betterment of the firm.

Master Printers Discuss Estimating Practices

The Masters Printers of Colorado met in monthly session at the Oxford Hotel in Denver on November 29. Estimating practices and trade practices came up for general discussion at the session.

Marlowe Visits Graham Home Office

R. J. "Bob" Marlowe, manager of the Denver office of the Graham Paper Co., spent the first ten days of December at the home office in St. Louis.

Thayer Visits Northwest Mills

H. A. Thayer, assistant manager of Carter, Rice and Carpenter of Denver, spent a fortnight extending from November into December visiting mills in the Pacific Northwest.

Northern Paper Mills Tissues Moving Fast

The Butler Paper Co., Denver branch, reports gratifying success in the sales of tissues manufactured by the Northern Paper Mills.

John D. Rue Becomes News Print Engineer

John D. Rue on December 1 assumed the duties of Engineer on the staff on the News Print Service Bureau to carry forward the work so excellently done during the past two years by W. G. MacNaughton, who has resigned in order to accept an offer in another field of activity.

Mr. Rue is well known to the North American paper industry. From 1921 to 1927, Mr. Rue was in charge



JOHN D. RUE
Joins the
News Print
Service Bureau

of the pulp and paper section of the Forest Products Laboratory at Madison, Wisconsin. Notable contributions to the progress of the industry were made under his direction, including the introduction of the rod mill for refining and hydration of fibrous materials and the semi-chemical method of cooking.

During the past two years, Mr. Rue has been Director of Research for the Champion Fibre Co., Canton, N. C., making a wide variety of papers. He is also Chairman of the Committee on Waste Utilization and Stream Improvement of the American Paper & Pulp Association, a leading member of the American Institute of Chemical Engineers, one of the earliest members of the Technical Association of the Pulp and Paper Industry, and a member of the Technical Section of the Canadian Pulp and Paper Association since 1920.

Floriston Mill Gets More Time

The U. S. Supreme Court last month gave its approval to an agreement reached between the State of Nevada and the Crown Willamette Paper Co., granting to the paper mill an extension of time in which to find a suitable method for disposing of its waste sulphite liquors which the State of Nevada and the city of Reno have contended are polluting the Truckee River. The river is a chief source of domestic water supply for Reno.

Pollution of the Truckee River has long been a bone of contention. For many months past the paper company has been carrying on a series of studies to find a suitable means of disposal. These have largely been in the direction of concentration of the liquor and spraying on wood refuse to be burned under the boilers. Although notable advances have been made it is not believed that the company is satisfied with the method as being commercially practicable, and consequently the sulphite mill has been closed down now for some time.

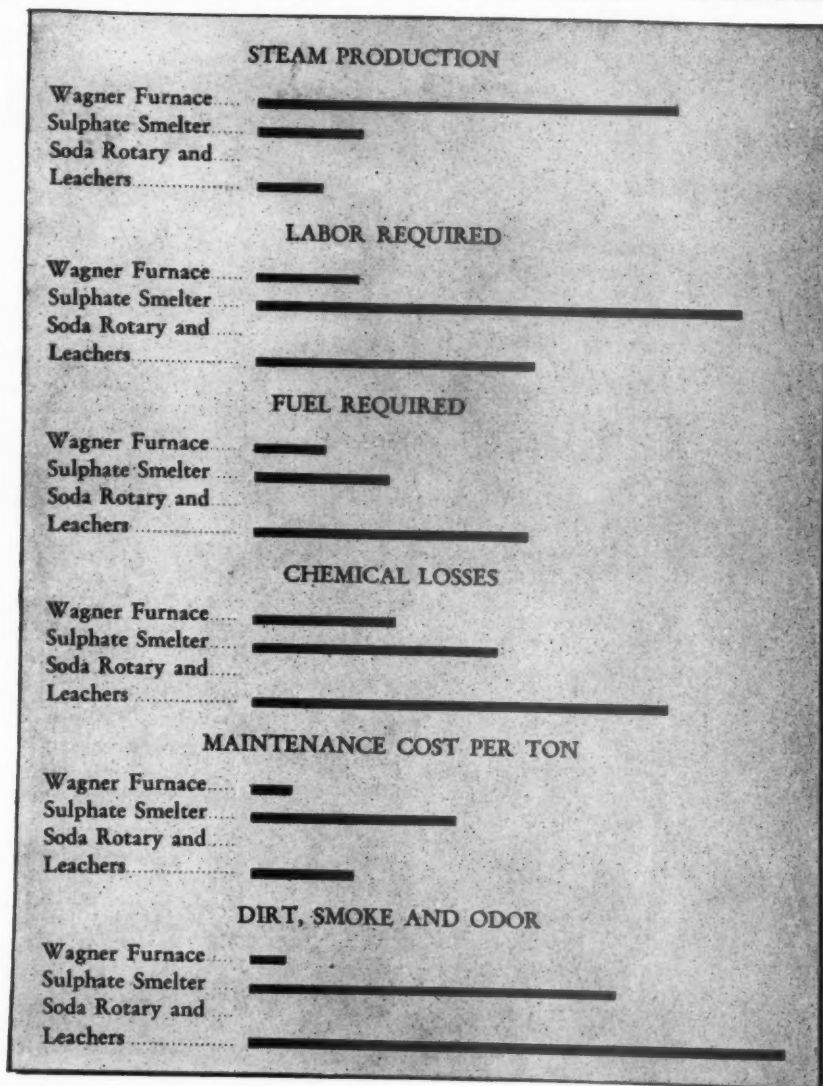
In the meantime exceedingly low water conditions in the Truckee River have not served to aid matters. There has been considerable speculation about the Floriston mill, which has a daily capacity of about 50 tons of paper, with its own groundwood and sulphite mills.

THE WAGNER FURNACE

FOR SODA AND SULPHATE PULP MILLS

*Comparative
Results*

**Wagner Furnace
and
Rotary Systems**



U. S. and Foreign Patents

J. O. ROSS ENGINEERING

Chicago

Main Office

In Canada—Ross Engineering of Canada, Limited

When writing to J. O. ROSS ENGR. CORP. please mention PACIFIC PULP & PAPER INDUSTRY

THE WAGNER FURNACE

A Repeat Order

The Brown Paper Mill Co., Inc.
Monroe, La.

Has Ordered



Additional Furnaces
for extension to present
Kraft Mill

Granted and Pending

CORPORATION — Sole Licensees
122 East 42nd Street, New York City **Portland, Ore.**

In Europe — Ernest Scott & Company, Ltd.

When writing to J. O. ROSS ENGR. CORP. please mention PACIFIC PULP & PAPER INDUSTRY

**Set-up
Folding
Corrugated
Solid Fibre**

BOARDS and BOXES

A department for interests allied
with the pulp and paper industry

**Board
Mills and
Paper
Converters**

Beyerl Leaves Western Paper Converting Co

C. F. Beyerl, for the past two years president and general manager of the Western Paper Converting Co., Salem, Oregon, turned over his interest in the business early this month to F. W. Leadbetter and associates. Mr. Beyerl is succeeded as manager by A. B. Galloway, sales manager for the Oregon Pulp & Paper Co., of that city. It was not learned if the company will carry out its expansion program previously announced in these columns.

Mr. Beyerl, who has been in poor health for several months, will take a two months' rest, after which he will again be connected with the paper industry, he says. Although intimating that he is working on plans to this end, he declined to discuss the matter.

Portland offices of the Western Paper Converting Co. have been removed from 403 West Park street to 429 Lumbermen's building. Malcom Smith is local representative.

Columbia and Northwest Tag Merge

Consolidation of the Columbia Paper Products Co. of Portland and the Northwest Tag & Label Co. of Seattle was effected early this month, according to George G. Guild, president of the Portland concern. The name of the Seattle unit will be changed to correspond with that of the Portland unit and Ben H. Gilman will be retained as manager of the former.

Merger of these companies, it was explained, will enable them with their joint facilities to serve the paper box and tag trade of the Pacific Northwest more efficiently through elimination of duplicated sales expense and stock.

The Columbia Paper Products Co., has been headed by Mr. Guild for the past 14 years. Recently the concern entered the set-up field and completed an expansion program to house the new department. About a year ago Mr. Guild purchased the Tag Products Co., Portland, which he merged with his other Portland interests.

Stettler Proposes Expansion

Proposed expansion of the F. C. Stettler Manufacturing Company's paper box and label plant, Portland, to take care of increased business, has occasioned the firm to make an informal request for vacation of the short stub of Occident street abutting their plant.

Double Width Toilet Paper

There has been some talk of introducing a toilet paper roll having sheets twice the width of the usual size presently offered. The double width roll would of course by necessity be a very high quality sheet and would cater to the better trade. Those who are advancing the idea have a number of very worth while arguments to offer in behalf of the idea.

To those who are inclined to scout the idea it may well be pointed out that the past quarter century has witnessed some very material advances in bettering the grades of this lowly but universally used product.

There have been changes here as well as in practically every other phase of manufactures.

If our living grandfathers had been told some years ago that they would one day see full page advertisements for toilet papers in national magazines do you suppose they would have believed it?

New Paper Twine Factory at Camas

After many months of patient secret experimenting J. W. and H. W. Duvall have blossomed out with a new paper converting company at Camas, Wash., known as the Perfection Twine Co. The product is twine made from kraft paper. The new machines have just been installed and the factory can now turn out 5,000 lbs. of twine a week.

The output is said to be sold for months in advance.

The machines and processes are largely the inventions of James Duvall, who has been associated with the paper converting department of the Camas mill of Crown Willamette Paper Co. for many years.

Northwest Envelope Adds Equipment

Northwest Envelope Manufacturing Co., of Seattle, has installed a new machine for rapid production of ordinary and special envelopes. The machine is capable of turning out 18,000 envelopes an hour.

Will Move Converting Plant to Vancouver

A site has not yet been chosen for the converting plant which Pacific Mills, Ltd., Canadian subsidiary of Crown-Zellerbach Corporation, proposes to establish in Vancouver, but a decision is expected before the end of the year so that the company can proceed with its program of bringing some of its finishing equipment closer to the agencies of distribution.

The mills, of course, will remain at Ocean Falls, where the company has an investment of some \$20,000,000, and which has been increased to the extent of about \$2,000,000 this year by the addition of power installations and other remodeling.

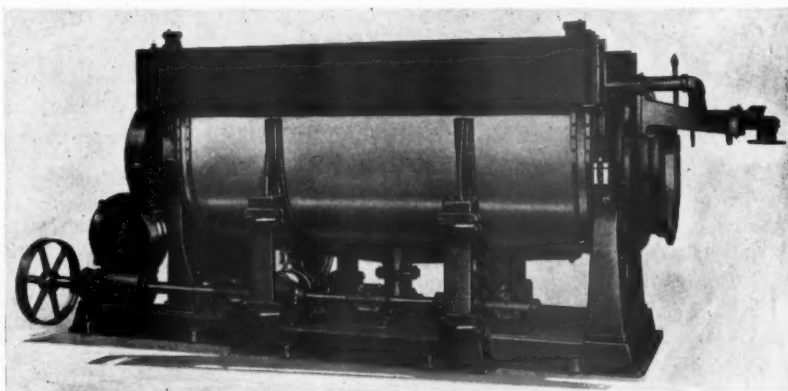
The paper converting plant to be erected in Vancouver will include machinery for making waxed papers, printing presses for the manufacture of printed wrapping papers, waxed bread wrappers and similar lines, as well as the printing of apple wrappers used in the Okanagan Valley orchard country. Machinery will also be installed for the manufacture of paper napkins and paper towels, which are declared to be in greater demand than ever.

The paper will be shipped from Ocean Falls to Vancouver for manufacturing into the wide variety of specialties planned by the company. Approximately 30,000 feet of floor space will be required for this plant and 75 to 100 employees will be required for the first unit.

The cost of the entire project will be well up in the hundreds of thousands of dollars, although a detailed estimate has not yet been made.

YOU CAN AFFORD BIRD SCREENS

THE paper makers who are already using Bird Screens-- the men who make over two-thirds of this Continent's paper --know that Bird Screens not only make better paper, but also make it at lower cost. Let us submit a layout for your mill. No obligation.



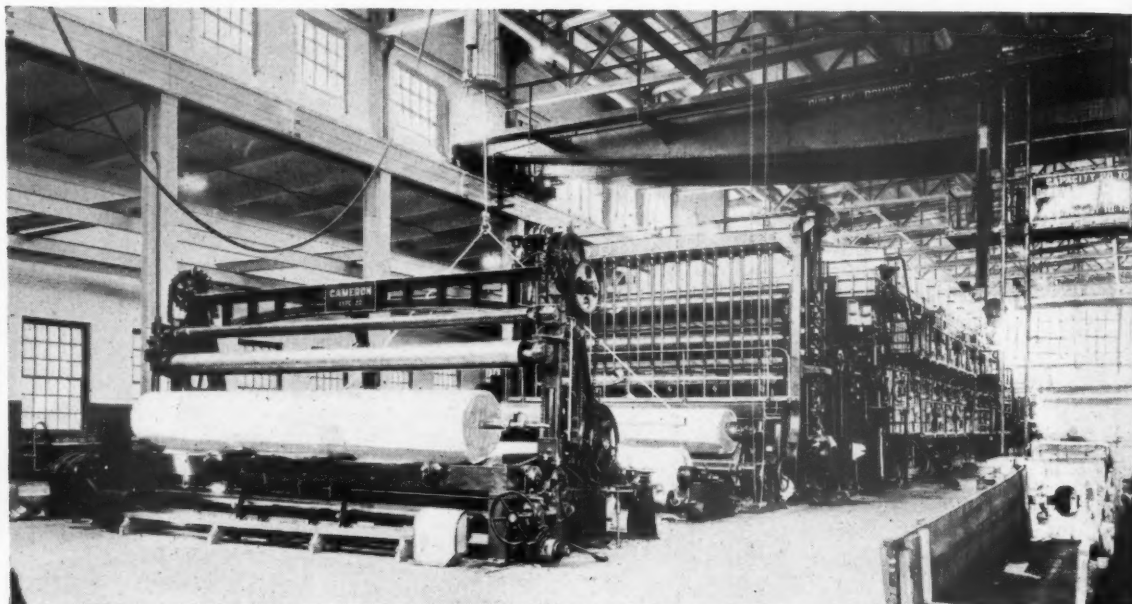
BIRD
MACHINERY

BIRD MACHINE COMPANY

S O U T H W A L P O L E
M A S S A C H U S E T T S

THE MINTON VACUUM DRYER

**MARKS AN ADVANCE IN THE PAPER MAKING INDUSTRY SECOND
ONLY TO THE ADVENT OF THE FOURDRINIER PAPER MACHINE**



*Two 234" High Speed News Machines equipped with Minton Vacuum Dryers
at Price Brothers & Co., Ltd., Riverbend, P. Q., Canada*

Announcement —

It gives us pleasure to announce to the Paper Industry that commencing November 20, 1929, the five Paper Machine Builders listed opposite have become associated with us and are now licensed under the Minton Patents to build and sell Minton Vacuum Dryers in the United States.

Inquiries for Minton Vacuum Dryers may be taken up with any of the five Paper Machine Builders or direct with us. Licenses to own and use Vacuum Dryers will be issued by the Minton Vacuum Dryer Corporation as heretofore.

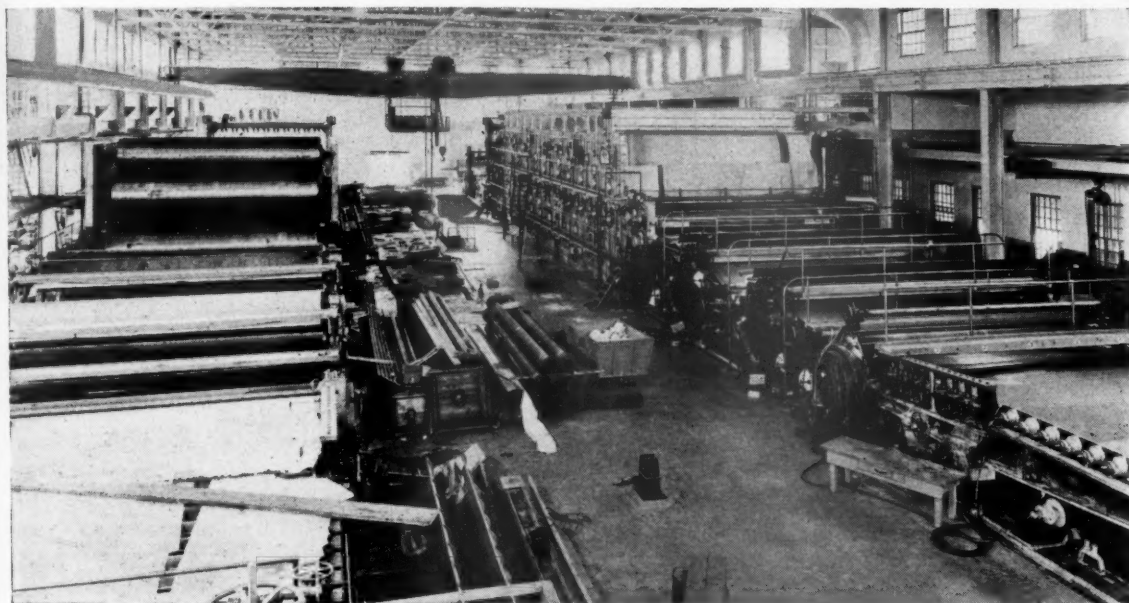
After a careful analysis and study of the Minton Vacuum Dryer, these Builders have decided in the best interests of the Paper Industry, which they have so faithfully served, to unite their efforts with ours in advocating the general use of the Minton Vacuum Dryer.

The close co-operation between the Minton Vacuum Dryer Corporation and the Machine Builders will effect economies in the manufacture and sale of Minton Vacuum Dryers which will further lower the cost to the purchaser.

MINTON VACUUM DRYER CORPORATION
GREENWICH, CONN.

THE MINTON VACUUM DRYER

**MARKS AN ADVANCE IN THE PAPER MAKING INDUSTRY SECOND
ONLY TO THE ADVENT OF THE FOURDRINIER PAPER MACHINE**



*The Wet Ends of the Two 234" High Speed News Machines
Referred to on Opposite Cut*

There are eleven Minton Vacuum Dryers in operation or under construction.

The Minton Vacuum Dryer offers the paper maker a positive technical control of his drying process. It operates independently of weather conditions. It is approximately half as long as a standard dryer section of equal capacity. Its thermal efficiency closely approaches 100%. The Minton Vacuum Dryer makes better paper and makes it cheaper.

LICENSED BUILDERS

THE BAGLEY & SEWALL COMPANY.....	Watertown, N. Y.
BELOIT IRON WORKS.....	Beloit, Wisconsin
THE BLACK-CLAWSON COMPANY.....	Hamilton, Ohio
THE PUSEY & JONES CORPORATION.....	Wilmington, Del.
RICE, BARTON & FALES, INC.....	Worcester, Mass.

MINTON VACUUM DRYER CORPORATION
GREENWICH, CONN.

S · A · F · E · T · Y FIRST—LAST and ALWAYS

The Best Safety Device Known Is a Careful Man



ROBERT H. SCANLON
has been appointed
regional safety
director for the West.

Robert H. Scanlon Is Safety Director

At the recent annual conference of the National Safety Council held in Chicago, Robert H. Scanlon, assistant mill manager of the Powell River Co. mills at Powell River, B. C., was appointed regional director of the west of the Pulp and Paper Section of the council.

Mr. Scanlon attended as a representative for his company. He has long been interested in the cause of safety and was at one time the editor of "Safety and Health", the original house organ for the Powell River Co. and the predecessor of the present "Powell River Digester."

Mr. Scanlon returned to Powell River late in November after an extended absence visiting mills in the East and advises that he has not quite had time as yet to formulate a finished program under his new title of regional director.

STATEMENT OF ACCIDENT EXPERIENCE—OCTOBER, 1929 Mills in State of Washington

COMPANY—	Hours Worked	Total Accidents	Frequency Rate	Days Lost	Severity Rate	Standing
Tumwater Paper Mills	23,458	0	0	0	0	1
Rainier Pulp & Paper Co.	65,961	1	15.1	7	.106	2
Everett Pulp & Paper Co.	92,992	2	21.5	30	.323	3
Crown Willamette Paper Co., Camas	298,888	10	33.5	204	.704	4
Puget Sound Pulp & Timber Co., Fidalgo Division	25,844	1	38.7	4	.155	5
Grays Harbor Pulp & Paper Co.	98,896	4	40.4	24	.243	6
Fibreboard Products Inc., Sumner	23,120	1	43.2	5	.216	7
National Paper Products Co.	106,397	5	47.0	94	.883	8
Cascade Paper Co.	51,200	3	58.6	44	.859	9
Puget Sound Pulp & Timber Co., San Juan Division	33,888	2	59.0	38	1.121	10
Washington Pulp & Paper Corp.	108,269	8	73.9	91	.840	11
Inland Empire Paper Co.	64,825	5	77.1	6,029	93.004	12
Fibreboard Products Inc., Port Angeles	51,496	5	97.09	109	2.117	13
Pacific Straw Paper & Board Co.	15,984	2	125.1	37	2.315	14
Pacific Coast Paper Mills	2,941	1	340.0	13	4.420	15

The Following Mills Not Reporting: Columbia River Paper Co., Longview Fibre Co.

Rossing Logs at Willapa Harbor

What is believed to be the first rossing plant to be used on Pacific Coast logs is now being operated by A. W. Hammond of South Bend, in the Willapa Harbor region of Washington. Mr. Hammond is also agent for the rossing machine which is manufactured in the New England states.

Mr. Hammond reports success in rossing logs ranging in size from 8 to 20 inches in diameter, and 8 feet in length. Logs larger than 20 inches are too cumbersome to handle satisfactorily with the present machine, but Mr. Hammond believes that this point may be easily remedied by suitable attachments.

The demonstration has shown that with three men it is possible to ross about 20 cords per 8-hour day. This is an appreciably higher volume than the 16 cords per day normally attained in the East, but Mr. Hammond attributes the higher Pacific Coast figure as being due to the generally larger size of the logs he is using.

The machine may be operated on a float in the water where the logger dumps into a log pond, or it may be conducted as a land operation when no log pond is available.

Mr. Hammond's costs for rossing are running about \$1 per cord. This, he explains, is somewhat higher than

hand peeling conducted in the woods during the four months when the sap is right for peeling, but is a lower cost than can be secured in the other eight months when the bark does not slip well.

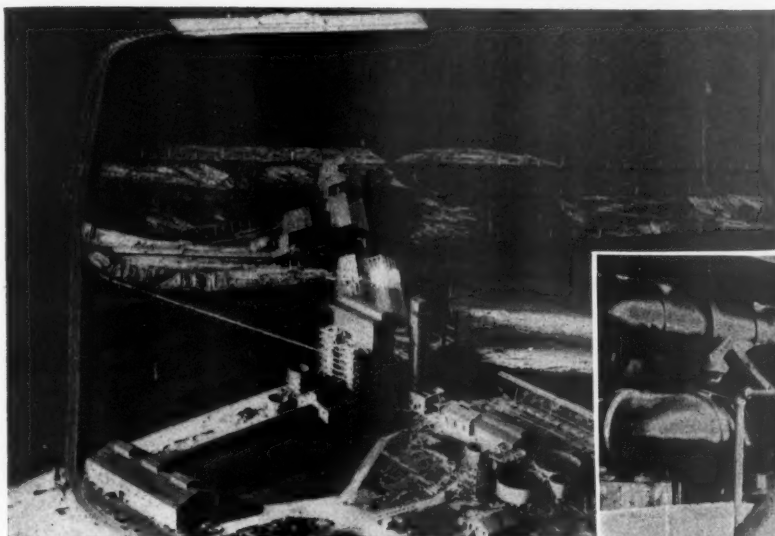
According to Mr. Hammond the machines are being used extensively in Eastern pulp mill wood operations, but for the best operation on the larger Pacific Coast logs he feels that the machines will have to be of heavier design. He feels that the machine will be of increasing importance as greater utilization of present day logging waste becomes more the order of the day.

Washington Supervisor of Hydraulics Quits

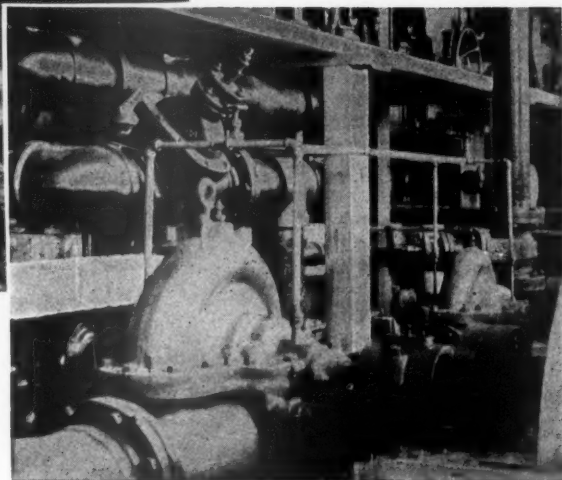
R. K. Tiffany, supervisor of hydraulics for the State of Washington, last month resigned his post. Charles J. Bartholet succeeded him.

Mr. Tiffany has associated himself with Lars Langloe of Olympia, hydraulic engineer, and in this private capacity will be engaged in development of power and irrigation projects in the Northwest.

Mr. Tiffany is well known to the pulp and paper industry of Washington, for it was through him that applications were made for water appropriation for power and industrial uses.



Aerial View of the SITKA SPRUCE
Pulp & Paper Company's New Pulp
MILL at EMPIRE, OREGON. . .



At Right—Several of the
WORTHINGTON
CENTRIFUGAL
PUMPS.

Worthington Centrifugal Pumps

In the new sulphite pulp mill of the SITKA SPRUCE PULP & PAPER COMPANY, Empire, Oregon, *Worthington Pumps* are used on all of the most important pumping jobs. Previous satisfactory experience with *Worthington Pumps* on the part of the men who designed and built the Sitka Spruce mill was the deciding factor in the selection of *Worthingtons*.

The pumps in the Sitka Spruce mill consists of—

Fresh Water Pumps
Pulp Pumps
White Water Pumps
Salt Water Pumps

For assistance in solving your own pumping problems call our nearest branch office for the services of a *Worthington Engineer*.

WORTHINGTON PUMP AND MACHINERY CORPORATION

Works: *Harrison, N. J. Cincinnati, Ohio Buffalo, N. Y. Holyoke, Mass.*

Executive Offices: 2 Park Avenue, New York, N. Y.


GENERAL OFFICES: HARRISON, N. J.

District Sales Offices:

Atlanta	Chicago	Dallas	El Paso	Los Angeles	Philadelphia	St. Paul	Seattle
Boston	Cincinnati	Denver	Houston	New Orleans	Pittsburgh	Salt Lake City	Tulsa
Buffalo	Cleveland	Detroit	Kansas City	New York	St. Louis	San Francisco	Washington

Branch Offices or Representatives in Principal Cities of all Foreign Countries

WORTHINGTON


PUMPS
COMPRESSORS
CONDENSERS
and Auxiliaries
DIESEL ENGINES
GAS ENGINES
FEEDWATER HEATERS
WATER, OIL and
GASOLINE METERS

Literature on Request

WORTHINGTON

When writing WORTHINGTON PUMP & MACHINERY CORP., please mention PACIFIC PULP AND PAPER

*New Types
New Models
New Machines*

EQUIPMENT

Manufacturers of, and dealers in, equipment used by pulp and paper mills, board manufacturers, converting plants, paper merchants, or any other branch of the industry may make their announcements in this department.

*New Dealers
New Branches
Appointments*

Bingham Develops Line of Pumps

Engineers of the Bingham Pump Co. of Portland have for the past two years been conducting in their own shop laboratory a series of experiments which have now resulted in the development of a complete line of pumps specially designed to meet the severe requirements of pulp and paper manufacturing.

In the company's Portland laboratory all pumps are tested under actual working conditions before delivery to purchaser. A wide range of experimental work has been carried out, such as testing stock pumps under dif-



President
R. V. BINGHAM
of the
Bingham Pump Co.
Portland.

ferent conditions of head and stock consistency. These tests, the Bingham company declares, have somewhat revolutionized some ideas on pumping heavy stock hitherto believed in by both mill operators and pump manufacturers.

The Fir-Tex Insulating Board Co., now building a huge plant at St. Helens, Oregon, for the manufacture of insulating fibre board, has placed an order with Bingham for 26 pumps. The order is believed to be the first time that a Pacific Coast firm has covered the blanket wants of a new mill for pump equipment.

For efficient handling of high consistency paper stock Bingham has developed a heavy duty, non-clogging pump with a three-vaned compound impeller and horizontal split case. Heavy duty, deep grooved ball bearings are conveniently mounted in a grease-packed cylinder. Casing may be removed without disturbing suction and discharge piping flange connections.

For handling sulphate liquor Bingham has developed a pump which employs special alloyed steel in all vital parts, giving to the pump long life and constant operating characteristics. A specially designed, water cooled stuffing box protects the packing from deterioration by liquor, reducing maintenance costs.

For the difficult job of handling sulphite liquor Bingham has developed an acid pump with hard rubber acid-resisting impeller mounted on a special alloyed shaft. Special consideration has been given to electrolytic action which commonly causes trouble on that portion of

the shafting passing through the pump stuffing boxes.

Other special duty Bingham products include white water, centrifugal, single and multi-stage horizontal and vertical pumps.

The Bingham Pump Co. was organized in 1921 by R. V. Bingham who now heads the company as president and general manager. In its nine years of existence the company has been a leader in the manufacture of pumps for building construction, irrigation and industrial use. The pumps have been marketed throughout the Pacific Coast states as well as in Alaska, Hawaii, the Philippines and South America.

Port Angeles Mill Orders 56 Screens

The Olympic Forest Products Co., now building the first 150-ton unit of a bleached sulphite pulp mill at Port Angeles, Wash., has placed an order for 56 Appleton flat screens.

These screens are a special type of improved flat screen which has been developed on the basic Appleton design. The Appleton line is handled on the Pacific Coast by Thomas Lovett of the Paper Mill Equipment Co., with offices in Portland. The screens are to be fabricated in the shops of the Willamette Iron & Steel Works of Portland.

Recently, delivery of four 12-plate Appleton flat screens was made to the Spaulding Pulp & Paper Co., of Newberg, Ore., which mill has recently installed its third Willamette digester and boosted its unbleached sulphite pulp capacity to 75 tons.

C. E. Saecker, secretary-treasurer of the Appleton Machine Co., of Wisconsin, recently made a trip to the Pacific Coast to look over pulp and paper industry conditions in general.

Bristol Expands L. A. Office

In former years The Bristol Company only maintained a small emergency stock in Los Angeles, however, they have now expanded to their own branch office and stockroom, at 703 Terminal Sales Building, 747 Warehouse Street, Los Angeles.

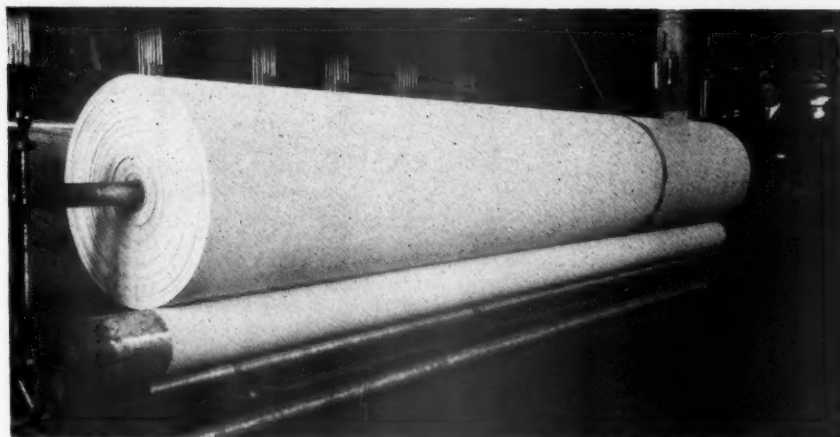
The men now connected with this new branch office are: S. W. Case, district manager; F. W. Borchers, sales and service engineer; C. M. Willis, service engineer.

The Bristol Company also have a branch office at 727 Rialto Bldg., San Francisco.

Y. F. Hardcastle Visits Coast

The Tacoma Electrochemical Co. was inspected early in December by Y. F. Hardcastle, vice president in charge of manufacturing, from the office of the parent organization, the Pennsylvania Salt Manufacturing Co., Wyandotte, Mich. Mr. Hardcastle spent about ten days on the Coast. He had been West previously about two years ago in connection with the establishment of the Tacoma plant.

This paper machine fabric,
242 inches wide,
186 yards long,
woven by the
**CALIFORNIA COTTON
MILLS**
is said to be
the largest of its
kind ever woven.



Link-Belt Roller Chain Data Book

Link-Belt Co., Indianapolis, has just published a new Roller Chain Data Book, No. 1257, which they claim is the most complete manual for properly selecting and applying chain yet developed.

This 96-page book illustrates the construction of the chains and wheels, and presents many pages showing practical applications of Link-Belt Roller Chain on light and heavy duty industrial drives, and on all types of machinery, tractors, trucks, farm implements, etc.

New Camas Digester Ready To Be Installed

The new 26-ton digester which is being installed as a part of the improvement program of the Crown Willamette Paper Co., at its Camas, Wash., mill is now nearly complete in the shops of the Willamette Iron & Steel Works of Portland and is ready for erection. The Willamette company also has on order a large number of tanks for the Camas mill.

Spaulding Purchases Two More Barkers

The Spaulding Pulp & Paper Co., of Newberg, Ore., has recently placed with the Paper Mill Equipment Co., of Portland, an order for two 72-inch improved type disc barkers which are now being fabricated in the shops of the Willamette Iron & Steel Works of Portland.

May Visit Pacific Coast

C. Stewart Lee, vice-president of the Pusey & Jones Corporation, builders of paper mill equipment, is expecting to toss routine aside at the executive offices at Wilmington, Delaware, sometime in January and make a visit to Pacific Coast mills, where a number of Pusey & Jones paper machines have been installed.

Dyestuffs For Coloring Paper

The General Dyestuff Corporation is distributing a new color card, "Dyestuffs for Coloring Paper." It is interesting to note that the dyeings were made on a regular fourdrinier machine.

The classification list given should be of considerable help to paper mill chemists and superintendents in selecting the proper colors for special purposes.

Correction

In the November number it was reported in error that Charles A. Newhall of Seattle was to represent the United Chromium Corp. We are informed by the company's San Francisco representative, L. A. Davies, that no appointments have been completed.

California Cotton Mills Makes Huge Fabric

What is reported to be the largest piece of woven fabric ever made in the world was recently completed by the California Cotton Mills of Oakland, Calif. The fabric was a new type "Super-Imperi Canvas" for the dry end of the paper machine. It is a new fabric made by the California mill to supply a demand for a weave hitherto imported from foreign mills. It is said to be a new fabric for the United States.

The first of these fabrics was shipped to the West Linn mill of the Crown Willamette Paper Co. and the big roll shown in the illustration herewith was shipped to the news print mill of the Washington Pulp & Paper Corp. at Port Angeles, Wash. This particular roll was 242 inches wide and 186 yards long.

In the past the California Cotton Mills made only three-ply and standard weaves, but the new fabric is in line with company's general policy of meeting the full needs of the growing pulp and paper industry on the Pacific Coast. The fabrics are distributed through the Pacific Coast Supply Co.

Represents Cascade Rubber Co.

Mr. L. C. Young is now representing the Cascade Rubber Co. of Seattle in field contacts. He has had about seven years experience in pulp and paper mills of the East and for some years has represented Seattle supply houses. The Cascade Rubber Co. established a plant some months ago in Seattle for rubber covering mill rolls.

SHIPMENTS OF OVERISSUE NEWSPAPER

From Pacific Coast Customs Districts—August, 1929

From Los Angeles			
Country of Destination—	Pounds	Dollars	
China	14,740	1,551,840	
Java	1,602	155,392	
Other Netherlands	1,123	102,000	
Hongkong	20,175	2,069,840	
Philippines	1,400	140,000	
Philippines	1,924	170,000	
Total	40,964	4,189,072	
From San Francisco			
Central America	396	30,000	
Orient	1,344	125,080	
Colombia	145	11,000	
China	2,765	280,000	
Japan	1,444	150,080	
Total	6,094	696,160	
From Washington			
Canada	222	3,307	
Total Coast Shipment	47,280	4,788,539	



Typical Pacific Northwest Forest on Lands Owned by the

PUGET SOUND PULP & TIMBER CO.

EVERETT, WASHINGTON

From Timber of This Class (Amabilis Fir, Spruce and Western Hemlock) We Manufacture

High Grade SULPHITE PULP

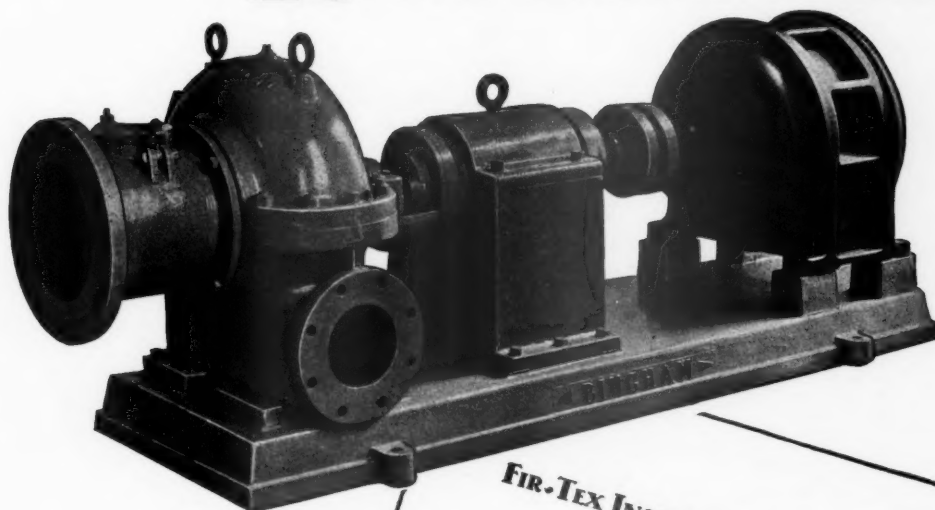
FOR DOMESTIC and EXPORT SHIPMENTS

When writing to PUGET SOUND PULP & TIMBER CO., please mention PACIFIC PULP AND PAPER INDUSTRY

FIR-TEX ORDERS...

INSULATING BOARD

26 BINGHAM PUMPS



*Bingham
Pumps
Are
Pacific
Coast
Made*

FIR-TEX INSULATING BOARD Co.
CAPACITY 250,000 SQUARE FEET DAILY
ST. HELENS, OREGON

December 6th, 1929.

Bingham Pump Company,
441 East Madison St.,
Portland, Oregon.
Gentlemen:

We are enclosing herewith your proposal dated October 10th, 1929 properly signed and accepted by us covering our full pump requirements consisting of all of the heavy stock pumps, white water, fresh water and fire underwriters pumps for our new plant at St. Helens, Oregon. Please furnish us with foundation plans on all units ordered.

We wish to commend your company on the detailed proposal you have made us, including the complete analysis of our pumping problem. We also appreciate the study you have made in your pulp laboratory of handling heavy long fibre stocks under our actual plant pumping conditions.

Our decision to use Bingham pumps exclusively was based entirely upon the quality of your pumps and the actual test results obtained at your laboratory, resulting in their high operating efficiencies, particularly the heavy stock pump, and your ability to give us direct factory service.

Yours very truly,

FIR-TEX INSULATING BOARD CO.,

J. E. McLaughlin
Vice Pres. & Gen'l Mgr.

ARM C
FIR-TEX
INSULATING BOARD

BINGHAM PUMP COMPANY

PORTLAND, OREGON

GENERAL OFFICE and FACTORY: EAST MADISON at SEVENTH

PAPER STOCK PUMPS — WHITE WATER PUMPS — ACID PUMPS — SULPHATE LIQUOR PUMPS

When writing BINGHAM PUMP Co., please mention PACIFIC PULP AND PAPER INDUSTRY

PACIFIC COAST PAPER EXPORTS—SEPTEMBER, 1929

	Newsprint		Printing		Writing		Greaseproof		Wrapping		Tissues	
	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
From LOS ANGELES—												
To Mexico	150	16	3,492	829	212	91	—	—	7,860	617	3,012	361
From SAN FRANCISCO—												
To Central America	297,120	8,730	—	—	92,483	4,545	—	—	7,510	612	2,050	241
To South America	34,242	1,366	—	—	—	—	10,640	966	41,206	2,764	8,600	585
To Orient	31,569	1,028	—	—	—	—	—	—	—	—	—	—
To Mexico	—	—	—	—	40,914	2,133	—	—	—	—	437	48
To Venezuela	—	—	—	—	14,806	925	—	—	—	—	—	—
To China	—	—	—	—	70	22	—	—	344	64	1,830	245
To Japan	—	—	11,005	1,505	95	88	—	—	300	72	175	121
To Philippines	—	—	—	—	10	5	80	18	—	—	12,890	1,400
To Australia	—	—	—	—	18	5	—	—	12,849	1,163	6,000	1,317
To Europe	—	—	—	—	621	131	—	—	3,816	241	720	57
To Canada	—	—	1,850	194	—	—	—	—	42,749	1,929	178	62
From OREGON—												
To China	211,545	7,000	—	—	32,949	2,048	—	—	117,296	5,038	—	—
To Philippines	611,044	20,469	—	—	41,893	11,254	2,435	236	108,524	4,747	—	—
To Brazil	—	—	—	—	68,727	3,532	—	—	2,825	215	—	—
To Japan	—	—	—	—	58,352	2,776	—	—	9,497	517	—	—
To Australia	—	—	—	—	87,423	4,302	—	—	—	—	—	—
To South America	—	—	—	—	—	—	—	—	13,332	874	—	—
From WASHINGTON—												
To Canada	131	7	253	62	7,697	728	3,786	342	89,304	4,232	97,501	6,242
To Argentina	48,495	1,465	—	—	—	—	—	—	—	—	—	—
To Japan	—	—	—	—	471	376	—	—	—	—	—	—
To China	—	—	—	—	—	—	—	—	—	—	1,550	95
Pacific Coast Total	1,234,296	40,081	16,600	2,590	446,741	32,961	16,941	1,562	457,412	23,085	134,943	10,774

	Board		Building		Boxes & Cartons		Paper Bags		Converted Paper Products		Miscellaneous Paper & Prod.	
	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
From LOS ANGELES—												
To Mexico	366	57	14,740	603	210	98	1,025	130	558	301	204	—
To China	—	—	35,571	627	—	—	—	—	—	—	—	—
To Philippines	—	—	1,620	173	—	—	—	—	—	—	—	—
To Australia	—	—	66,805	390	—	—	—	—	—	—	362	48
To Canada	—	—	—	—	—	—	—	—	—	—	—	—
From SAN FRANCISCO—												
To Canada	42,688	1,627	—	—	617	60	—	—	333	191	650	—
To Mexico	132	27	—	—	—	—	—	—	16	8	234	—
To China	1,581,296	35,203	50,067	1,344	—	—	—	—	130	54	222	—
To Orient	219,825	5,515	93,610	2,895	1,400	180	—	—	—	—	—	—
To Australia	16,094	1,305	147,400	4,379	800	104	—	—	5,199	339	11,791	—
To Philippines	135	30	—	—	4,712	792	10,654	751	942	361	510	—
To Central America	235	73	500	70	—	—	68,766	3,959	174	58	83	—
To South America	—	—	14,838	783	—	—	47,385	2,515	2,962	1,497	—	—
To Europe	—	—	4,500	140	—	—	615	71	80	14	—	—
To Japan	—	—	87,500	2,794	805	165	—	—	80	22	300	—
To Colombia	—	—	—	—	193	12	4,704	346	40	27	15	—
To Norway	—	—	—	—	—	—	—	—	—	—	9	—
From OREGON—												
To China	—	—	—	—	1,256,103	257,773	3,420	223	—	—	—	—
To Australia	—	—	—	—	236,912	7,818	—	—	—	—	—	—
To Colombia	—	—	—	—	—	—	768	90	—	—	—	—
To Peru	—	—	—	—	—	—	26,750	1,600	—	—	—	—
To Philippines	—	—	—	—	—	—	160,506	9,127	1,938	115	114	—
To Europe	—	—	—	—	—	—	—	—	—	—	39	—
From WASHINGTON—												
To Canada	221,902	15,786	—	—	2,202	125	1,541	181	1,833	663	3,272	—
To Philippines	173,937	9,361	—	—	6,500	300	—	—	24	2	1,409	—
To Australia	1,320	72	—	—	—	—	—	—	—	—	—	—
To Japan	2,007	158	—	—	—	—	—	—	772	329	115	—
To China	—	—	—	—	1,461	86	—	—	173	52	28	—
Pacific Coast Total	2,259,937	69,214	517,151	14,198	1,511,915	267,513	326,134	18,993	15,254	4,033	19,405	—

Total All Paper Exports for Month of August, 1929.....3,353 tons;

Total All Paper Exports for Month of September, 1929.....3,568 tons;

Total All Paper Exports for Nine Months, 1929.....26,804 tons; \$2,860,668

Washington shipped the following wood pulp during September, 1929: To Italy, 122 tons, \$6,614; To United Kingdom, 593 tons, \$32,067; To Japan, 181 tons, \$11,825. San Francisco shipped the following soda pulp during September, 1929: To Japan, 40 tons, \$3,704.

CLASSIFICATIONS—For convenience of presentation, some classifications have been combined, as follows: "printing," includes book (not coated), cover and surface coated paper; "greaseproof" includes water-proof; "tissues" includes crepe, tissue, paper towels, napkins and toilet; "board" includes boxboard, bristol, bristolboard and other paper board and strawboard; "building" includes sheathing, and other building paper; "writing" includes fancy papeteries and other writing; "converted paper products" includes envelopes, cash register rolls, index file and other office

forms; "miscellaneous" includes blotters, paper hangings, vulcanized fibre sheets, strips, rods and tubes, manufactures of vulcanized fibre and other paper products. **COUNTRIES**—Under the classification "Central America" are included all of the Central American countries and Cuba. "South America" includes only the following South American countries: Ecuador, Paraguay, Bolivia, Uruguay, and the Guianas; other South American countries are classified separately. "Orient" includes all the Asiatic countries with the exception of China and Japan, which are separately classified. New Zealand is included under "Australia."

Visits Powell River

Herbert Parker, representative of the Manchester Guardian, one of the outstanding newspapers of Great Britain, was a recent visitor at Powell River, where he inspected the mills in the course of a study of the news print industry of Canada.

On the Sick List

Several officials of the Powell River Company's mill force have recently recovered from serious illness. They are Richard Sandwell, resident engineer; Larry Heap, of the office staff, and Frank Nello, safety engineer.

*"...so long ago
I can't remember"*
said R. H. Pangborn

JUST when and where did you buy your first Shell Mill Lubricants, Mr. Pangborn?" we queried the vice-president and general superintendent of Shaffer Box Company down at Tacoma, the other day.

"I don't remember—it was so long ago," he came back. "But I've bought a lot of them since."

You can ask any one of a dozen mill operators what they think of Pangborn ability and judgment and get the same answer: "He's one of the best in this country."

And the fact that he uses Shell Mill Lubricants exclusively in his own factory is pretty fair evidence that they fill the bill.

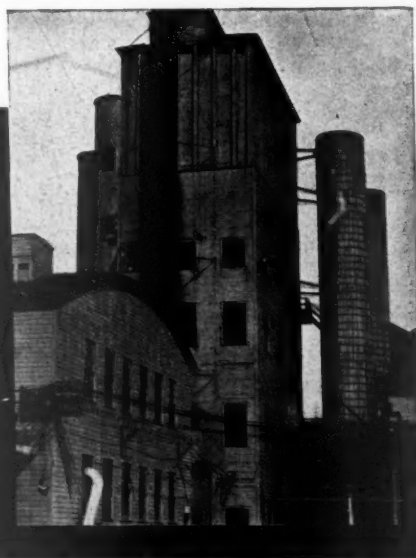


R. H. PANGBORN

The capable vice-president and superintendent of operations at Shaffer Box Co.



A view of the Shaffer Mill and box factory at Tacoma



The Shaffer paper pulp mill

SHELL MILL LUBRICANTS

When writing SHELL OIL CO., please mention PACIFIC PULP AND PAPER INDUSTRY

PACIFIC PULP & PAPER INDUSTRY

U. S. Pulp and Paper Production
September, 1929

According to identical mill reports to the American Paper & Pulp Association from members and cooperating organizations, paper production in September registered a decrease of 8% as compared with August, 1929, and an increase of 8% over September, 1928. Paper production for nine months ending September, 1929, showed an increase of 7% over the same period of 1928.

All individual grades, excepting bag and wrapping papers, registered increases over last year in the month's output. Uncoated book paper production showed an increase of 20% over September, 1928, and hanging increased 14%, tissue 10%, writing 10%, paperboard 8%, newsprint 5%, and felts and building 5%. Production of bag paper decreased in September, 1929, as compared with September, 1928, by 6% and wrapping paper 3%.

Shipments of all grades in September, 1929, excepting newsprint, bag and wrapping papers, increased over September, 1928, the total shipments being 6% above the total of last year.

All grades, excepting paperboard, wrapping, bag, tissue and hanging papers, registered increases in inventory at the end of September, 1929, as compared with August, 1929. As compared with September, 1928, all grades, excepting paperboard, felts and building, and hanging papers, showed substantial decreases in inventory. The total stock on hand for all grades was 0.3% over August, 1929, but was 3% below that of September, 1928.

Identical pulp mill reports for September, 1929, indicated that the total production of all grades of pulp was 3% greater than September, 1928.

During September, 1929, 17% more bleached sulphite pulp, 17% more kraft and 13% more groundwood pulp was consumed by reporting mills than in September, 1928. The total shipments to outside markets of all grades of pulp in September, 1929, were 6% lower than the total for September, 1928.

All grades of pulp, excepting bleached sulphite, easy bleaching sulphite, mitscherlich sulphite and soda, showed decreases in inventory at the end of September as compared with the end of August, 1929. As compared with September, 1928, all grades, excepting easy bleaching sulphite and kraft pulp, registered decreases in inventory.

REPORT OF PAPER OPERATIONS IN IDENTICAL MILLS FOR
THE MONTH OF SEPTEMBER, 1929

GRADE	Production Tons	Shipments Tons	Stocks on Hand End of Month— Tons
Newsprint	108,155	107,495	26,490
Book (Uncoated)	89,192	88,804	39,665
Paperboard	214,049	215,688	63,365
Wrapping	47,406	47,742	49,313
Bag	13,724	13,786	5,053
Writing	28,933	27,959	38,446
Tissue	13,123	13,698	8,552
Hanging	6,087	6,153	5,336
Felts and Building	6,128	5,702	2,705
Other Grades	24,453	23,847	16,389
Total—All Grades	551,250	550,874	255,314

REPORT OF WOOD PULP OPERATIONS IN IDENTICAL MILLS
FOR THE MONTH OF SEPTEMBER, 1929

GRADE	Production Tons	Used During Month—Tons	Shipped During month—Tons	Stocks on Hand End of Month— Tons
Groundwood	66,431	83,736	3,048	69,335
Sulphite News Grade	36,642	32,174	5,841	6,178
Sulphite Bleached	24,756	23,413	1,051	2,879
Sulphite Easy Bleaching	3,088	2,837	207	827
Sulphite Mitscherlich	6,779	5,800	813	683
Sulphate Pulp	29,539	24,571	5,221	6,017
Soda Pulp	23,129	15,025	7,860	4,380
Pulp—Other Grades	58	—	—	102
Total—All Grades	190,422	187,556	24,041	90,401

IMPORTS OF PULP WOOD AND WOOD PULP INTO THE UNITED STATES BY COUNTRIES

AUGUST, 1929

Compiled by the U. S. Department of Commerce Bureau of Foreign and Domestic Commerce
(Figures Subject to Revision.)

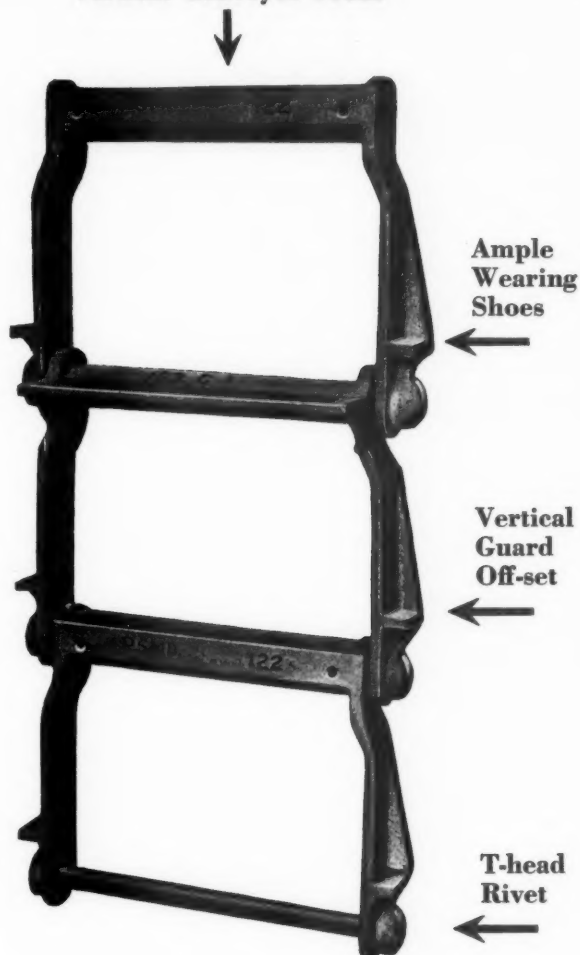
COUNTRIES	PULP WOOD				PULP WOOD				PULP WOOD			
	Rough		Other		Peeled		Other		Rough		Other	
	Cords	Dollars	Cords	Dollars	Cords	Dollars	Cords	Dollars	Cords	Dollars	Cords	Dollars
Canada	104,257	1,062,522	6,298	61,671	72,380	875,988	12,419	128,253	1,847	21,265	—	—
Total Pulp Wood Imports for August, 1929—197,201 cords; \$2,149,699.												

WOOD PULP

COUNTRIES—	Mechanically Ground		Chemical Unbleached Sulphite		Chemical Bleached Sulphite		Chemical Unbleached Sulphate		Chemical Bleached Sulphate		All Other Wood Pulp	
	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars
Austria	—	—	200	8,114	254	17,686	—	—	—	—	—	—
Czechoslovakia	—	—	—	—	186	13,194	—	—	—	—	—	—
Estonia	—	—	247	12,122	—	—	—	—	—	—	—	—
Finland	533	13,830	9,972	496,356	1,472	80,210	3,791	185,398	96	6,606	—	—
Germany	—	—	2,111	117,950	3,149	240,064	—	—	28	2,112	12	890
Lithuania	—	—	118	6,367	—	—	—	—	—	—	—	—
Norway	300	3,966	1,702	88,046	5,952	445,824	1,999	99,164	—	—	—	—
Poland and Danzig	—	—	—	—	—	—	372	16,687	—	—	—	—
Sweden	152	4,128	30,397	1,629,716	3,332	253,549	16,792	826,589	550	29,216	—	—
Yugoslavia and Albania	—	—	390	16,044	—	—	—	—	—	—	—	—
Canada	21,096	522,049	17,947	840,080	15,552	1,193,641	9,600	593,056	628	56,538	385	28,197
Total	22,081	543,973	63,084	3,214,795	29,897	2,244,168	32,554	1,720,894	1,302	94,472	397	29,087

Total Imports of All Grades of Pulp for August, 1929—140,315 tons; \$7,847,389.

Vertical Conveyor Front



1 Here is correct design, sound engineering that makes the whole conveyor system *function* with the ultimate minimum of interruption and care.

2 And here is superior material. Strength to the core; toughness all through the link and rivet; ductility; and a surprising rust-resistance.

We supply ALL chain needs promptly. And we have helpful engineering aid at your service.

Puget Sound Machinery Depot
SEATTLE

Office and Salesroom:
322-324 First Ave. So.

68 First St.
Portland, Ore.

P.S.M.D.

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News Print Production In October

The News Print Service Bureau's Bulletin No. 142 states that production in Canada during October, 1929, amounted to 251,914 tons and shipments to 252,591 tons. Production in the United States was 122,009 tons and shipments 122,040 tons, making a total United States and Canadian news print production of 373,923 tons and shipments of 374,631 tons. During October, 23,841 tons of news print were made in Newfoundland and 1,727 tons in Mexico, so that the total North American production for the month amounted to 399,491 tons.

The Canadian mills produced 295,942 tons more in the first ten months of 1929 than in the first ten months of 1928, which was an increase of 15 per cent. The United States output was 9,260 tons or 1% less than for the first ten months of 1928. Production in Newfoundland was 20,324 tons, or 11% more in the first ten months of 1929 than in 1928 and in Mexico, 2,213 tons more, making a total increase of 309,219 tons or 9% over the same period in 1928.

During October the Canadian mills operated at 88.8% of rated capacity, United States mills at 80.4% and Newfoundland mills at 112.0%. Stock of news print paper at Canadian mills totalled 30,064 tons at the end of October and at United States mills 26,573 tons, making a combined total of 56,637 tons which was equivalent to 3.5 days' average production.

NORTH AMERICAN PRODUCTION In Tons of 2000 Pounds

	Canada	United States	Newfoundland	Mexico	Total
1929—Oct. _____	251,914	122,009	23,841	1,727	399,491
Ten Months _____	2,249,795	1,160,757	212,226	15,751	3,634,529
1928—Ten Months _____	1,949,853	1,170,017	191,902	13,538	3,325,310
1927—Ten Months _____	1,170,220	1,248,822	167,434	11,853	3,138,329
1926—Ten Months _____	1,549,222	1,401,988	151,102	10,612	3,112,924
1925—Ten Months _____	1,252,902	1,263,098	71,695	10,659	2,598,354
1924—Ten Months _____	1,128,949	1,240,205	54,272	9,580	2,433,006
1923—Ten Months _____	1,058,463	1,246,990	53,546	10,000	2,368,999

Port Mellon Ceases Work

The Vancouver Kraft Co., Ltd., which has been extensively remodeling the old Howe Sound mill at Port Mellon, B. C., into a modern 100-ton sulphate pulp mill discontinued all work on November 16. No explanation is given by President F. W. Leadbetter. The project included a large sawmill and was largely completed altho the construction has been proceeding more slowly in recent months than had normally been anticipated.

Chapman Retires From Business

E. A. Chapman, former secretary of Hawley Pulp & Paper Co. for several years, has retired from active business owing to ill health. Mr. Chapman has been a lifetime in the business, beginning at Stockton, California.

The HOTEL CONGRESS

The stopping place in Portland
for Pulp and Paper Men.



Sixth at Main
Street
PORTLAND
OREGON

200 Rooms—200 Baths
Convenient Downtown
Location.
Reasonable Rates Prevail.

LOUIS E. BOGEL, Resident Manager



ALL IN ONE BASKET

WHEN all of your eggs are in one basket—it pays to watch that basket!

That's exactly the case in a paper mill—where production, deliveries, quality of paper and profits all depend on the operation of the Fourdrinier wire.

That's why superintendents select Tyler Fourdrinier Wires for their machines!

They know that Tyler wires can be depended upon to lie flat and smooth, that they will run straight and true without friction, and that they will make a high quality sheet free from defects.

They know Tyler wires are durable and dependable—that they are good for long and continuous operation without repairs or adjustments.

It will pay you to try Tyler wires on your machines.



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screening
WOOD
CHIPS



HUM-MER
Electric
SCREEN
*
Send
for
literature

The W. S. TYLER COMPANY
CLEVELAND, OHIO

IMPORTS OF PULP WOOD AND WOOD PULP INTO THE UNITED STATES BY COUNTRIES

SEPTEMBER, 1929

Compiled by the U. S. Department of Commerce Bureau of Foreign and Domestic Commerce

(Figures Subject to Revision.)

COUNTRIES—	PULP WOOD				PULP WOOD				PULP WOOD			
	Rough		Other		Peeled		Other		Rough		Other	
	Cords	Dollars	Cords	Dollars	Cords	Dollars	Cords	Dollars	Cords	Dollars	Cords	Dollars
Soviet Russia in												
Europe	3,313	53,405										
Sweden					990	9,900						
Canada	61,287	657,753	4,465	43,799	75,952	934,656	11,442	145,025	3,304	36,717		
Newfoundland &												
Labrador			3,313	39,688			2,241	26,432				
Total	64,600	711,158	7,778	83,487	76,942	944,556	13,683	171,457	3,304	36,717		

Total Pulp Wood Imports for September, 1929—166,307 Cords; \$1,947,375.

COUNTRIES—	WOOD PULP				WOOD PULP				WOOD PULP				WOOD PULP			
	Mechanically		Chemical		Chemical		Chemical		Chemical		Chemical		All Other			
	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars
Austria					265	17,775	50	3,823					13	2,445		
Czechoslovakia			104	4,678	105	7,612										
Estonia			1,192	59,114												
Finland	227	5,738	6,863	344,189			4,880	236,903	23	1,603						
France													25	2,739		
Germany			1,134	65,246	2,781	214,630	49	2,132								
Latvia			45	1,875												
Norway	200	2,644	626	32,637	865	60,472	1,299	64,059								
Poland and Danzig			145	6,382			484	21,784								
Sweden	185	4,777	26,870	1,417,649	4,291	338,546	24,806	1,254,413								
Yugoslavia and Albania			500	21,116												
Canada	17,840	468,892	17,462	856,965	15,209	1,174,562	9,452	559,832	101	9,634	480	35,910				
Total	18,452	482,051	54,941	2,809,851	23,516	1,813,597	41,020	2,142,946	124	11,237	518	41,094				

Total Imports of All Grades of Pulp for September, 1929—138,571 Tons; \$7,300,776.

COTTON DRYER FELTS

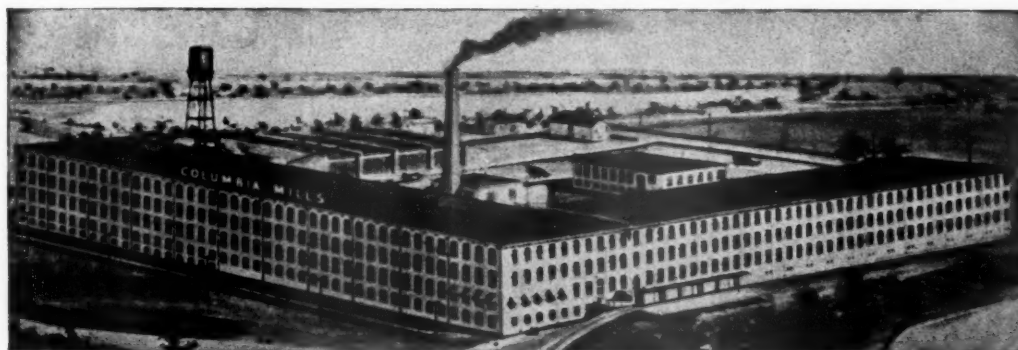
"Mt. Vernon" Standard Weave

Medium—Standard—Extra Heavy
Widths "60 to 164"

"Richland" Triplex Weave

Widths 68" to 210"

Felts within above ranges made in lengths as required.



Columbia, S. C., Plant of Mt. Vernon—Woodberry Mills, Inc., Baltimore—where "Richland" Felts are made.

Orders must be placed sufficiently in advance to insure satisfactory delivery.

Branch Offices

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TURNER, HALSEY COMPANY

74 Leonard Street, New York

Sole Selling Agent for

MT. VERNON—WOODBERRY MILLS, Inc.

Canadian Exports of Pulp and Paper October, 1929

The Canadian Pulp and Paper Association reports exports of wood-pulp and paper from Canada in October valued at \$17,896,151. This was an increase of \$2,311,622 over the previous month but was somewhat below the total for October, 1928.

Wood-pulp exports for the month were valued at \$3,703,414 and exports of paper at \$14,192,737, as compared with \$4,232,557 and \$14,107,462 respectively in October 1928.

Exports of the various grades of pulp and paper in October were as follows:

	October, 1929		October, 1928	
PULP—	Tons	Dollars	Tons	Dollars
Mechanical	15,703	452,441	21,136	587,795
Sulphite Bleached	20,305	1,564,010	22,869	1,748,017
Sulphite Unbleached	19,534	969,904	18,477	921,780
Sulphate	11,712	664,543	15,706	914,877
Screenings	2,982	52,516	2,956	60,087
	70,236	3,703,414	81,144	4,232,557
PAPER—				
Newsprint	232,441	13,604,221	214,228	13,576,872
Wrapping	1,455	161,278	1,368	150,545
Book (cwts.)	7,197	59,664	4,948	39,892
Writing (cwts.)	84	1,862	548	5,292
All Other		365,712		
		14,192,737		14,107,462

For the first ten months of the current year the total value of pulp and paper exported from Canada amounted to \$163,514,218 as compared with \$157,889,459 for the corresponding months of 1928, an increase for this year of \$5,624,759.

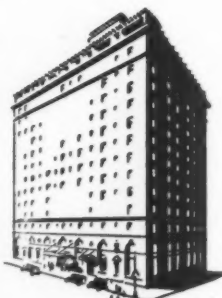
Exports of wood-pulp for the ten months were valued at \$36,041,663 and exports of paper at \$127,472,555 as compared with \$37,655,890 and \$120,235,569 respectively in the ten months 1928.

Details of exports for the ten months of 1929 and 1928 are as follows:

	10 Months 1929		10 Months 1928	
PULP—	Tons	Dollars	Tons	Dollars
Mechanical	168,085	4,652,929	158,372	4,318,550
Sulphite Bl.	212,743	16,145,018	211,069	15,990,237
Sulphite Unbleached	162,755	8,040,464	176,097	8,845,695
Sulphate	113,446	6,663,065	135,284	7,981,777
Screenings	30,250	540,187	25,820	519,631
	687,279	36,041,663	706,642	37,655,890
PAPER—				
Newsprint	2,061,321	122,368,162	1,797,238	115,272,255
Wrapping	12,576	1,369,898	13,256	1,452,681
Book (cwts.)	63,172	538,015	55,369	458,644
Writing (cwts.)	3,934	36,872	4,017	37,377
All Other		3,159,608		3,012,612
		127,472,555		120,235,569

Exports of pulpwood have been smaller this year, the quantity shipped in the first ten months being 1,174,975 cords valued at \$12,030,452 as compared with 1,406,731 cords valued at \$14,047,232 exported in the corresponding months of 1928.

New Washington Hotel SEATTLE



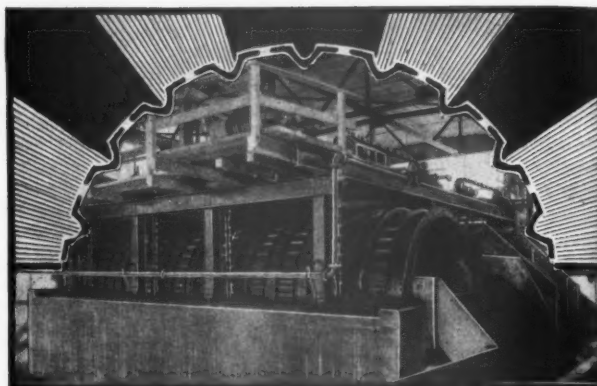
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Excellent Food

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Everything"

Rooms all with bath
From \$3

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IS YOUR BARKING CAPACITY GUARANTEED?

The U-Bar Barking Drum is guaranteed for two years at a minimum speed of 7½ R.P.M. (10 ft. diam.) running half-full of wood at an average of 3,000 working hours per year. This is all in addition to the usual guarantee of workmanship and materials.

HOW THE U-BAR GUARANTEE INSURES BIG PRODUCTION

This guarantee insures BIG and sustained production. Three factors govern capacity: Interior Surface, Volume and Speed. Examine the U-BAR Drum from these angles:

1. *Interior Surface:* U-BARS bark more quickly and cleanly with no unnecessary loss of wood fibre.

2. *Volume:* You can keep a U-BAR Drum HALF-FULL of slabs or logs all the time—a 10'x30' U-BAR Drum, for instance, carries a working load of five cords of wood. Think of it!

3. *Speed:* 7½ R.P.M. are guaranteed in the U-BAR Drum and many mills increase their capacity greatly by stepping this up to 10 R.P.M. Speed is important.

When you consider barking drums, insist on a capacity guarantee.

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Production records of the Union Bag and Paper Mills attest to the efficiency of the Morterud System of Indirect Soda and Sulphate cooking. It produces an even cook and a greater yield with forced circulation of preheated liquor. Steam is not introduced directly into the digester but circulates through a series of seamless steel pipes and the condensed water is pumped back to the boilers. Therefore there is no dilution in digester and less steam is used in the evaporation of liquor.

THE GIANT NEKOOSA BARK PRESS

Make a steam generating asset out of your bark disposal problem with this wonderful Bark Press. It reduces the water in bark to 55% bone dry—which is almost natural water content. Simple operation. Strong and rugged construction. Surprisingly great economies result from the use of this machine.

Full Details Sent on Request

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Canadian Barking Drum Co., Ltd., Drummond Bldg., Montreal

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U-BAR
DRUMS

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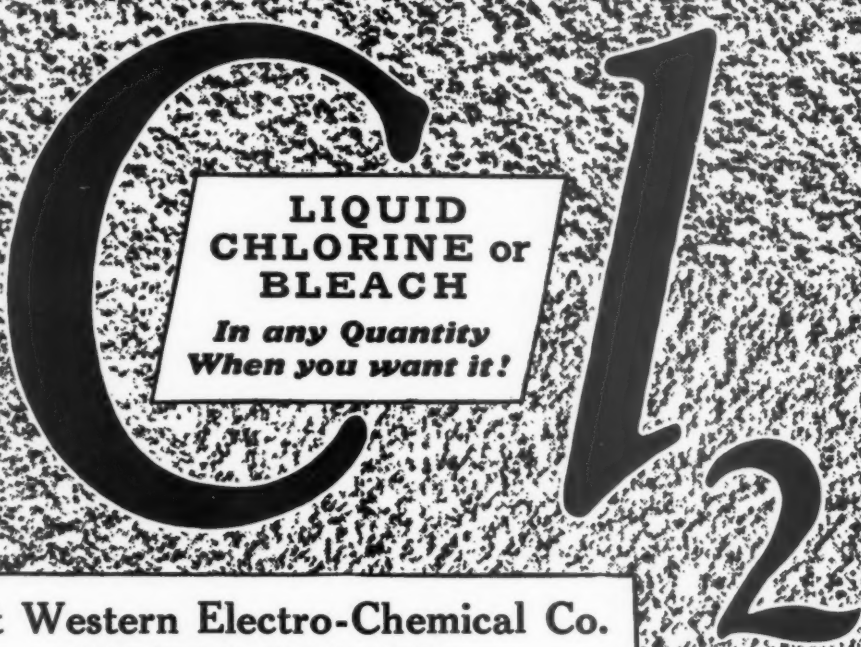
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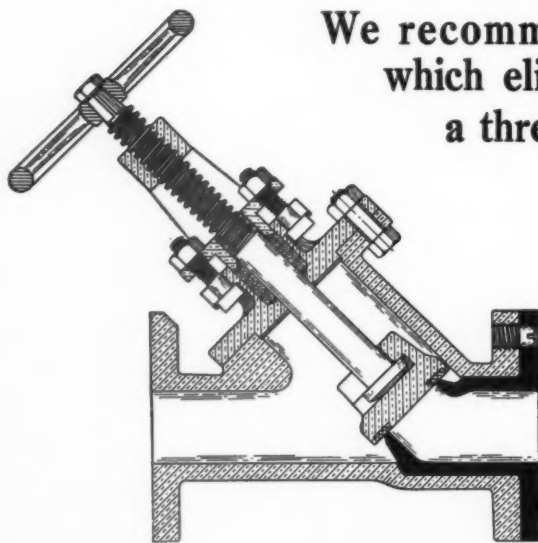
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75 to 85 per cent**

A P & H Diesel uses only half as much fuel as a gasoline shovel, and that fuel costs only about one-third as much per gallon. Thus fuel savings alone are from 75 to 85 per cent.

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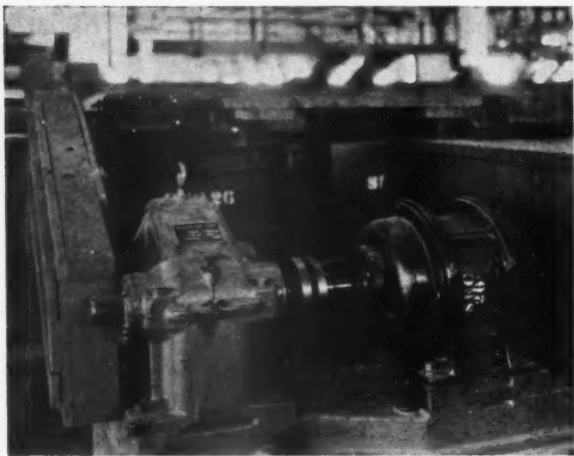
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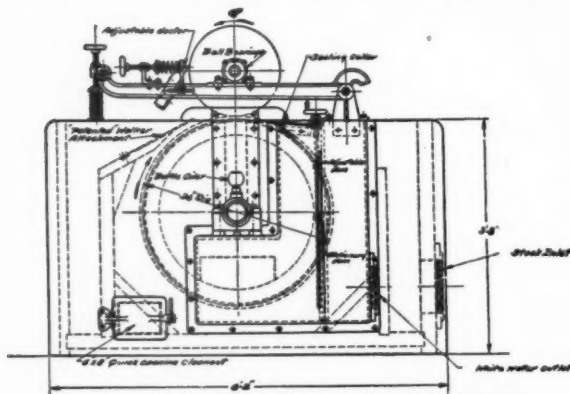
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Our Double Sealing Collars prevent loss at cylinder ends.

See Paper and Pulp Mill Catalogue for description and functions of these machines.

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State your special requirements, and our Engineering Department will submit recommendations.

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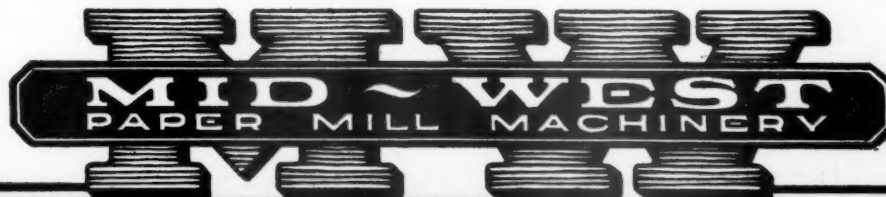


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No doubt they would have liked to take part in the festivities. But twenty miles in those days was a long, long way.

The descendants of these two men are making felts today, but much better felts than these pioneers in 1858. Little wonder that Hamilton Felts take out water in more than usual quantities; that wear long with less down time for washing; that help to produce a better finished piece of paper. In back of them is this 71 years of experience.

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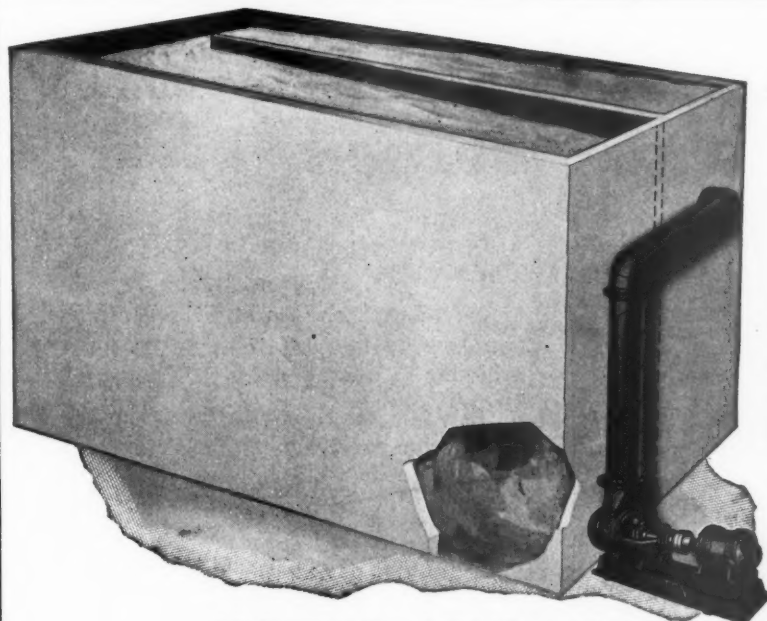
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Hamilton, Ohio

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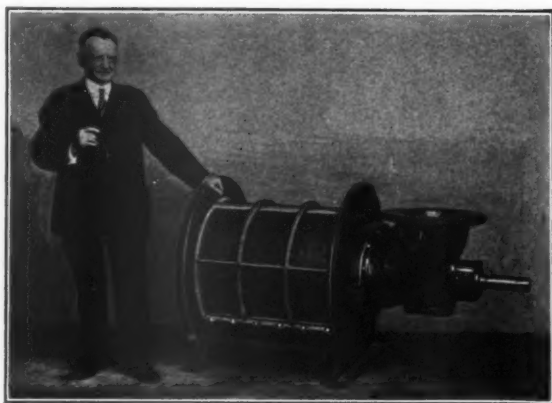
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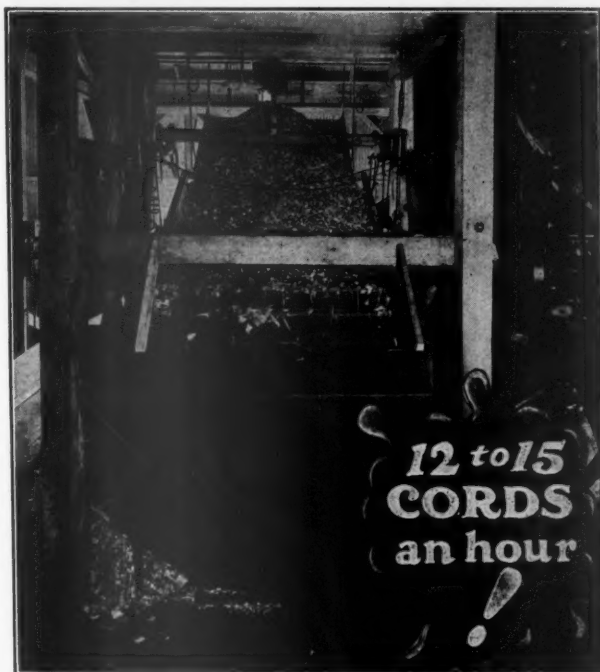
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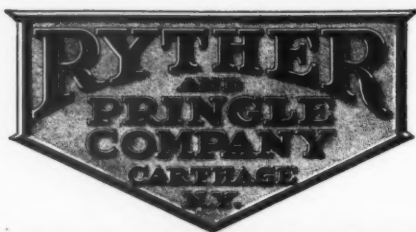
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**More Hours of Steady Service
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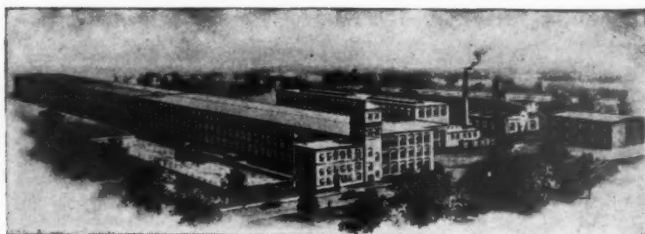
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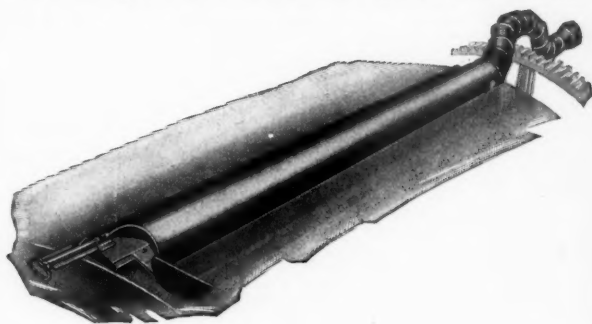
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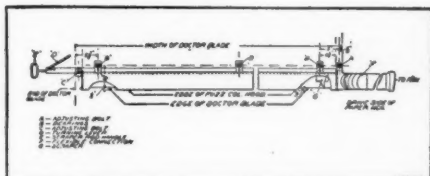
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for Paper Machine Doctor Blades



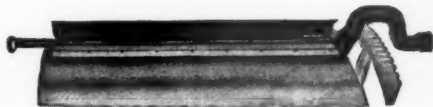
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Installation permits continuous operation of Doctor Blade.

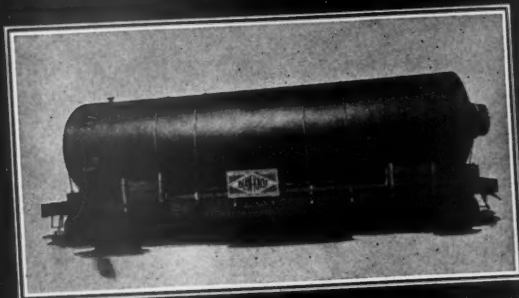


Impossible to plug this device with wet broke. In event of wet end dryer break, paper skinned off builds up blade and automatically lifts hood to position shown above.

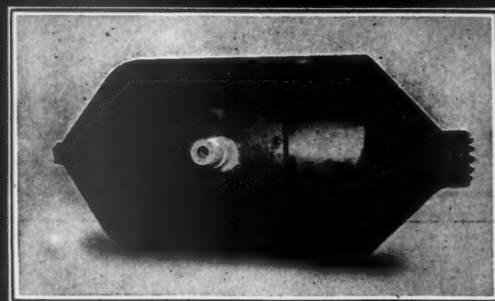
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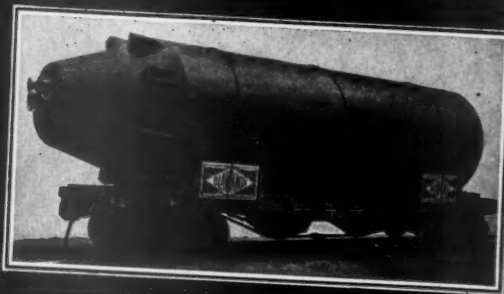
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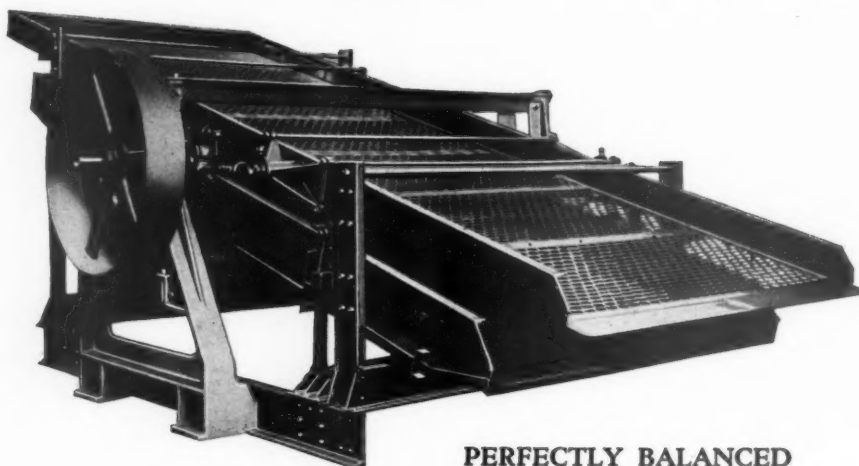
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NATIONAL DYES



Pictured above is the Biggs Field Welding Crew putting the finishing touches on a Biggs 14-foot diameter All-Welded Rotary Digester at the plant of the Sylvia Paper Board Company, Sylvia, N. C. This is one of many installations shown in Biggs' new folder, "Unusual Steel Plate Construction". A copy is yours for the asking.

Biggs All-Welded Rotary Digesters

Biggs has built and erected eleven 14-foot diameter All-Welded Rotary Digesters for use in connection with chestnut chip and similar processes where riveted construction proved unsatisfactory.

The difficulties of maintenance have been completely overcome. There are no more leaks around rivet heads and seams to contend with.

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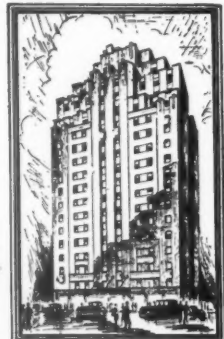
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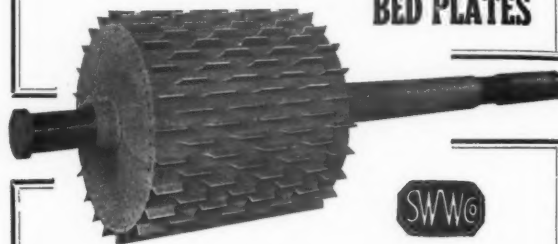
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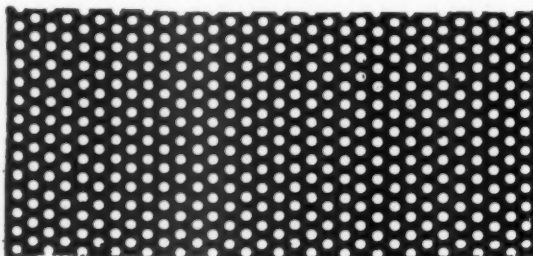
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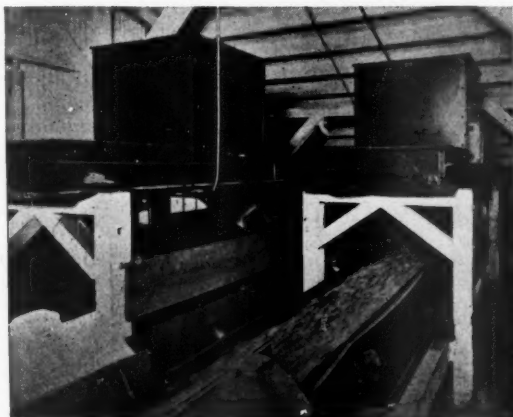
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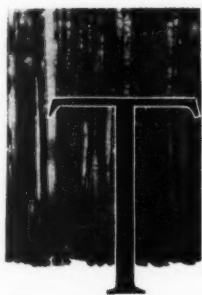
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Logging Waste in the Douglas Fir Region

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Associate Forester, Office of Forest Products
U. S. Forest Service, Portland, Oregon

INTRODUCTION



THE principal object of this survey is to indicate the quantity and general character of material left unutilized, after logging, in the woods of the Douglas fir region¹. The information is based on a systematic study² of representative logging operations in western Oregon and Washington, the combined output of which amounts to one-fourth of the logs produced in these two states.

While much of the presentation is statistical in character, general observations and suggestions for improved utilization are given in an effort to contribute to the solution of the wood-waste problem.

Due to many contributing factors the logging methods and practices in the Douglas fir region have always resulted in seemingly excessive logging waste. Such terms as "logging waste", "wood losses" and "wood waste", as used in this publication apply to sound

timber, cordwood size and larger, left in the woods by the loggers to rot or to be burned, regardless of whether its utilization is practicable under present methods and existing economic conditions. The absence of reliable information as to the extent and character of this logging waste, on the part of the wood-using industries generally, has doubtless retarded concerted and sustained research directed to better utilization. In the last analysis it is such research that must finally determine whether economical corrective measures are feasible.

The elimination or salvaging of logging waste would not only prolong the life of the virgin forests, but would aid greatly the practice of forestry. Better or complete utilization of the timber, for example, would make the prevention and control of forest fires easier and would leave the land in a better condition for the production of new forest growth. Obviously, if the forest industries of the region are to continue to supply a large proportion of the nation's forest products, a way must be found to correlate logging methods and suitable forestry practices.

SOME FACTORS COMMONLY CONSIDERED AS AFFECTING LOGGING WASTE

The logging of forests almost universally means that varying amounts of material which, because of size or character, cannot profitably be used are left in the woods as so-called waste.

The Douglas fir region of Oregon and Washington contains about one-fourth of the country's remaining saw timber and it is here that nearly one-third of the nation's lumber supply is produced. There is probably more unutilized wood left per acre in this region, excepting possibly the redwood region, than in any other lumbering section. The reasons for this

¹ The Douglas fir region includes practically all the land west of the summit of the Cascade Range in Oregon and Washington and a large part of British Columbia. The portion included in the United States, which is the part dealt with in this publication, has an average width of 120 miles and a length of 470 miles, embracing approximately 56,000 square miles. It is now, and with proper management will probably always be, one of the world's greatest lumber-producing regions.

² The field work was done in the summers of 1926 and 1927. The author wishes to acknowledge his indebtedness to all those who have aided in the work in any way, particularly the following: The management and employees of the logging operations studied; H. M. Johnson, H. R. Spelman and J. H. Buell, members of the Forest Service, also A. Koroleff, until recently a member, who assisted with the field work and compiling the data.



An Area in the Douglas Fir Region After Logging and Broadcast Burning



The large western hemlock log, 40 feet long and 45 inches in diameter, was left in the woods as a cull, because of the small amount of heart-rot appearing at one end. The small hemlock logs were left because they were too small to take out at a profit. (Puget Sound Region)

condition are many. Some of these are the character of the forest and topography, the infestations of wood destroying fungi and insects in standing and down timber, the results of forest fires that have occurred in the past, and the action of wind and sleet storms, most of which were due to natural causes and were largely uncontrollable. Others are the result of broad and complicated economic forces. Many may be attributed to common methods and practices of the industry. Nearly all of them, unfortunately, are inter-related, precluding a satisfactory analysis of their relative importance. However, some of the more important factors causing or contributing to logging waste should be pointed out in order to understand the conditions surrounding the survey itself, or the actual data derived from it.

MARKETS FOR AND VALUE OF FOREST PRODUCTS

The factors of supply and demand have an important relation to logging waste. If the number of high-grade logs that are produced were not sufficient to meet the demand there would be a tendency for the market to absorb smaller logs and logs of poorer grade.

Of the several primary forest products of the region, as shown in Table 1, lumber is the most important and amounts in volume to nearly nine-tenths of the annual output. The markets and the price received for this commodity, therefore, are very important from the standpoint of good utilization. The distances to the larger domestic markets, however, are so great as to give other competing regions the benefit of shorter

hauls and therefore lower transportation costs. This tends to depress the price of lumber in the Douglas fir region to a point where production cost closely approximates the selling price. Due to this condition, as well as other economic factors, the market for logs has been weak and critical, thus limiting the sale of small, rough logs, particularly those from the less-favored species such as western hemlock and true firs (Abies) which are found in the forest in mixture with the more valuable species.

The ability of the market to absorb even relatively small amounts of such items as pulpwood, shingles, cooperage, poles and piling and a number of secondary products has a beneficial effect on utilization in the woods, since it provides an outlet for certain types of material which cannot profitably be used for lumber. The demand for these products, however, is still not great enough to make any noticeable impression upon the large amounts of low grade material which remain in the woods after logging.

Pressure to Operate and Liquidate Stumpage

Not only have large bodies of timber in the Douglas fir region been bought and held more or less for speculation, but the producing branch of the lumber industry of the region has necessarily carried over so much larger supplies of raw material in the form of stumpage than is the case with other industries, excepting those engaged in the production of oil, coal and the like. Because of excessive carrying charges on this standing timber such as interest on borrowed capital, advancing tax rates, costs of fire prevention and suppression, as well as the desire on the part of some owners to realize on their stumpage investments, there is apparently a strong pressure to liquidate stumpage through cutting. This, in addition to the more or less wholesome pressure to operate that is common in most industries, has resulted in over-production, even during periods of a sluggish or a falling market, with attendant wood losses in both mills and woods.

Organization of the Industry

The lumber industry of the Douglas fir region has developed around distinct manufacturing centers and the territories tributary to these are thought of as production districts. The size and position of the latter have been influenced by the location of deep-water ways and drainage routes which have affected water transportation of logs and lumber, and the location of railroads which radiate from large centers of population and markets. The most important of the production districts from the standpoint of lumber production are Puget Sound, Columbia River, Grays Harbor, Willamette Valley, Coos Bay, Toledo-Tillamook, and Willapa Harbor. The location of these is indicated on the accompanying map.

The amount and character of unutilized wood left by the loggers in each of these districts varies somewhat, as shown by the survey. This is in part due to difference in the character and type of timber and to logging conditions found within them. It may also be partly attributed to differences in industrial practices used in the various districts for taking the logs from the woods and converting them into the final product. A considerable portion of the region is inland, where it has been expedient to build "inland" sawmills that must depend entirely upon railroads for the transportation of both logs and finished product. On the other hand the larger portion of the region is situated within easy reach of deep-water harbors from which cheap water transportation is accessible for logs and finished products. Here the sawmills are located where water and railroads meet and are known as "tidewater" or "cargo" mills.

TABLE 1—TIMBER CUT IN THE DOUGLAS FIR REGION FOR PRIMARY FOREST PRODUCTS—1926¹

Primary forest products ²	Douglas fir M ft. b.m.	Western hemlock M ft. b.m.	"White" firs M ft. b.m.	Sitka spruce M ft. b.m.	Western red cedar M ft. b.m.	Other species ³ M ft. b.m.	Total M ft. b.m.
Lumber	7,830,993	1,272,599	14,488	294,725	200,412	129,469	9,742,686
Shingles	-----	-----	-----	-----	543,437	-----	543,437
Wood pulp	-----	150,253	38,210	38,777	-----	14,776	242,016
Veneer	95,109	1,000	2,700	49,428	-----	10,664	158,901
Poles and piling ⁴	50,125	3,000	-----	-----	53,125	-----	106,250
Cooperage	59,573	4,930	-----	24,582	-----	-----	89,085
Total	8,035,800	1,431,782	55,398	407,512	796,974	154,909	10,882,375

¹ Log scale. Except for veneer and cooperage based on 1926 statistics, includes a relatively small amount of timber cut in southwestern Oregon which, strictly speaking, is not really a part of the Douglas fir region.

² Conversion factors used: An over-run of five per cent was assumed in converting tally of lumber cut to log scale; 10,000 shingles equals 1,000 ft. b.m.; one cord equals 500 ft. b.m.

³ In the case of lumber, western yellow pine, Port Orford cedar, sugar pine, western white pine, incense cedar and some hardwoods; wood pulp, cottonwood, poplar and small quantities of Douglas fir which could not be segregated from the statistics; veneer, Port Orford cedar and hardwoods.

⁴ Estimated.

As a rule timber that is used by inland sawmills is owned and logged by the same management that owns the sawmill. When logging is done under these circumstances the operator is locally known as a "logger-manufacturer". Tidewater mill owners also operate in this way but many of them own no timber and do no logging. Instead they buy logs which have been taken out of the woods by so-called "independent loggers". The independent logger does not operate a sawmill but specializes in logging only.

The ease with which logs can be transported by water long distances from the woods to the consuming plant has encouraged trade. This has led to the formation of booming and rafting companies and towing companies. It has also resulted in the development of log markets at most of the larger production centers where logs are bought and sold. These markets in turn have resulted in the establishment of log-scaling and grading bureaus which are employed to determine the grade and contents of the logs.

The existence of open log markets, which establish log prices on a competitive basis, together with standard log grades and scaling and grading practices, is of advantage to both seller and buyer. The markets provide an avenue for the movement of small and low-grade logs which might otherwise be left in the woods and in this way they assist in better utilization. On the other hand, when logs are bought and sold on a competitive basis, particularly when the market is favorable to the buyer, it means the logger must raise the general average grade of his logs by cutting out more defect and leaving the rougher and poorer logs in the woods. This is the way that selling logs on a competitive basis has reacted upon the independent loggers.

PRACTICES AND LOGGING METHODS OF THE INDUSTRY

The loggers of the Douglas fir region fell all of the trees that are considered merchantable. These are cut into logs, and by means of high-speed power equipment are skidded to the railroad irrespective of the presence of smaller or otherwise less desirable trees, which occur in large numbers in many stands of timber. The huge trees, when they are thrown, tend to mash down many of the trees that are left. Others are pulled over or are knocked down by the logs as they are dragged over the ground to the log landing where they are loaded on cars. After logging is completed, the remaining trees together with great masses of broken and culled logs, tree tops, wind-falls, snags, limbs and underbrush, are burned broadcast at a suitable season of the year. The mixture of small trees, having a diameter of from six to eighteen inches and with little or no present value with large timber, either as individuals or as patches of a few or more acres, presents a problem which automatically results in waste. Not infrequently areas occur within the logging operation which contain no merchantable trees but have grown up with dense stands of small timber. The logger takes out the surrounding commercially-valuable trees and, so far as the logging operation is concerned, does not damage the second growth unless, which often happens, the logs are dragged through it. When the slash is burned, however, usually no precaution is taken to protect the young stand that remains and since the area is surrounded by the hot slash fire the trees are usually killed. In other cases such small timber is frequently sacrificed for a very few large trees that are standing with it.

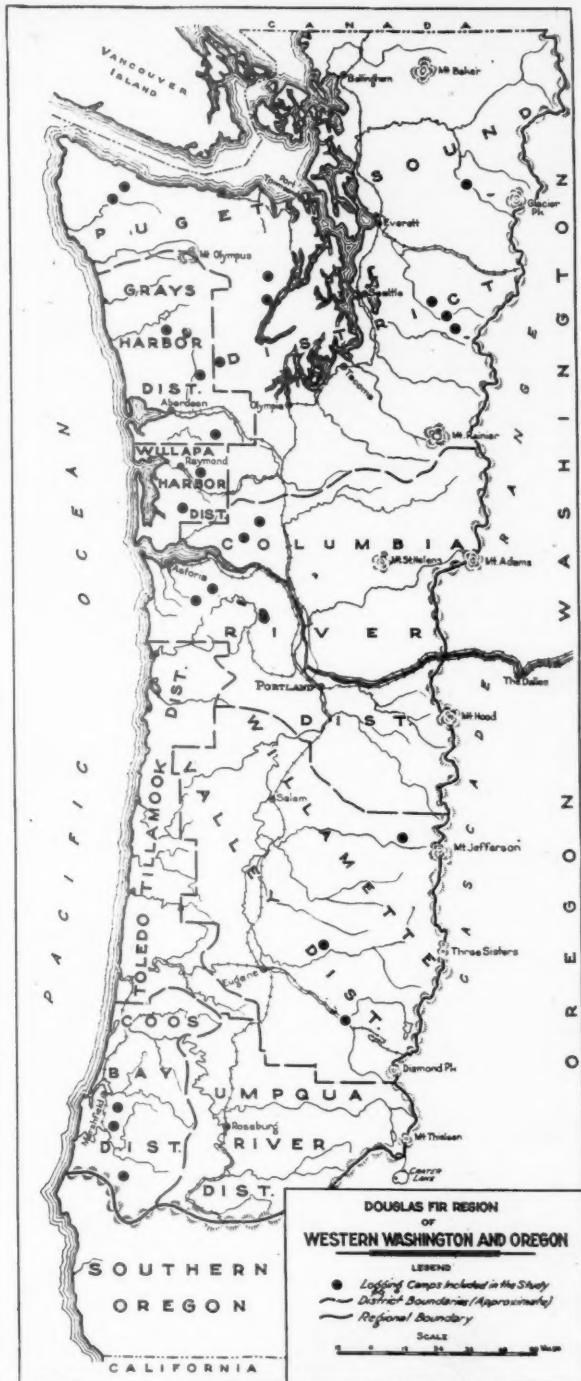
Log-Making

A large percentage of the logging waste in the region is due to breakage resulting from felling the tall, heavy trees and in bucking them into logs—especially the former. The timber occurs in exceedingly dense stands and usually the trees vary in size, soundness and general character. The amount of breakage ranges from three or four per cent or more, depending upon ground conditions, the character of the timber and the skill and care of the workmen.

Losses would not be so great if the fractures were square across the timber, but frequently the bole of the tree is split and shattered for many feet of its length, quite often resulting in the loss of a whole log length, or more, of first-class material.

In the process of felling timber, not only does the loss of wood occur in breakage, but considerable valuable material not infrequently is left in excessive stump heights. Cutting trees 15 to 20 feet from the ground, which was practiced in the early days, has been abandoned but there is still room for improvement.

While bucking the trees into logs is not accompanied by nearly as much loss as is the operation of felling, there are large amounts of waste resulting from this part of the work. Considerable loss frequently results from not utilizing as much



of the tops as could be taken; also in the bucking of crooked trees in the wrong place. Cutting too far above or below the crotch of forked trees and too far from the break in broken timber, or defective portions of the tree, are common causes of loss. In large timber and rough ground failure to relieve stresses through a proper initial cut, indifferent wedging, and carelessness in putting in props results in comparatively heavy loss, logs not infrequently being slabbed or split for a considerable length.

Yarding Logs

Whether a log is valuable enough to be skidded from the stump to the railroad, loaded onto cars and transported over long distances, depends upon its species, size, smoothness and

amount of defect which it contains—in other words, its merchantability. General instructions, usually verbal, from the management as well as custom and general standards of the region are the basis of determining this quality. The requirements seemingly vary greatly. Most operators are very rigid in requiring that all logs of reasonable size and soundness be yarded, but a few go to the opposite extreme and leave a large portion of the No. 3 logs, the lowest of the three grades of commercial logs recognized in the region.

A few companies are utilizing some logs down to a minimum size of 12 inches in diameter at the small end and 16 feet long, the character of the log otherwise warranting, but these are exceptions. As a general rule, when logs as small as this are taken they are used by the loading crew to top out loads of much larger logs and in most cases the minimum log size is very much larger than this. Due to the fact that the size of the minimum log varies with the type of logging operation and with the species and character of timber, an accurate estimate of its dimensions is impossible to make. However, as nearly as can be judged after a study of the data furnished by the survey and upon the basis of general observations made in nearly all parts of the region, the average minimum log, for all species, now being taken out of the woods will fall into one of the following sets of dimensions:

Diameter Inches	Length Feet	Volume F. B. M.
14	40	370
16	30	400
18	28	370
19	26	390
20	22	380
22	18	380

As to the extent of rot permissible, it is also difficult to generalize. Not only is it hard to estimate the quantity of such defect in a given log, but the allowable amount varies with the quality of the timber. Large, smooth logs that are one-half defective are usually taken out of the woods. An estimate based upon the findings of the survey and general observations indicate that as a common practice small or rough logs that are more than one-third defective are left in the woods. In many cases logs containing considerably less defect than this are culled.



—Photo by D. C. Ingram, U.S.F.S.

A Defective Douglas Fir Log

Description: Diameter small end 37"; length 41'; gross scale 6,470 ft. b.m.; defect 1,941 ft.; net scale 4,529 ft. The outer part not defective contained material that would saw out "C Clear" (Select) or better lumber. The material on the inside of the log including the dark stained portion was material that would produce No. 2 or No. 3 Common lumber. Many such logs, containing millions of feet of sound wood, are left in the woods as culls.

In order to handle the larger timbers, most of the equipment used for yarding logs is built along massive lines. Each unit represents a very large investment and is costly to operate and maintain. Such equipment is not adapted for profitable hauling of small or short logs, explaining in part the tendency to leave small logs in the woods of the Douglas fir region.

The topography as a rule is steep and the ground is broken and the three factors, weight and length of logs, power of machinery and roughness of ground, combine to cause much loss through breakage and shatter of logs as they are pulled from their resting place in the woods and are speeded through stumps and slash to the loading deck. Frequently, as logs are taken by the "sky-line" equipment across topographic depressions the lower end of a swinging log strikes the ground in such a way as to break in the center or at the choker and is discarded because of its shortness. In many cases the short pieces broken off and dropped enroute to the landing are never picked up.

Leaving Logs in the Woods

Sometimes yarding crews accidentally or intentionally overlook merchantable logs that are lying in obscure and difficult places or in distant corners of the yarding side. This form of loss, in part the outgrowth of poor supervision, is more common than one would imagine.

Logs piled or skidded to one side of the railroad right-of-way are sometimes left for several months before they are picked up. This results in loss of sound material through stain and defect caused by weathering, wood-boring insects, and fungi. In other cases when the logging railroads are being constructed logs cut in clearing the right-of-way are sometimes buried under fills and are lost sight of.

As a general rule yarding follows quite closely the operation of felling and bucking but sometimes the latter gets behind and in case of an unexpected shut-down the timber that is on the ground is sometimes left for several months. Here again the attacks of fungi and wood-boring insects begin and the losses from these causes may run into thousands of feet before the operator realizes it.

Transportation of Logs to Market

The cost of transporting logs, whether by company-owned or common-carrier railroads, water towing or by any combination of these, constitutes a substantial item in the total cost of logging. Therefore, like other heavy cost items, it tends to force the leaving of low-grade material in the woods; it usually costs more to haul the low-grade material.

A large percentage of the logs of the region are hauled, for all or a part of the distance to the mill, over common-carrier roads. In some cases the rate, as a result of the long length of haul, amounts to a considerable sum per thousand feet and of course is based on the gross log scale. With the railroad rates applying to the gross scale of the logs, the actual cost per thousand feet of sound material for hauling logs containing rot may be considerably higher than the quoted rate. Hence it is that here, as well as in other steps of the logging operation, the logger must exercise caution in handling logs a portion of which consists of material that cannot be sold or utilized.

The length of water haul is not as important from the standpoint of waste as the length of railroad haul, since the relative cost is very much less. Towing charges are based on distance but once the logs are out of the woods, sorted and rafted the comparative cost of towing them for long distances is not much greater than for short distances.

Water hauls, on the other hand, do have an indirect bearing upon logging waste. Logs of even lengths and sizes are easier to make up into rafts than if some of them are long and others short, or if some are very large and others are very small. Very crooked logs or short pieces increase the cost of the work and may endanger the security of the raft by causing it to break up in rough water, and for this reason among others, they are usually not taken out. The butt logs of western hemlock sometimes do not float easily and sink to the bottom as soon as they are dumped into the water or in a very short while after. For these reasons sinker logs are quite often left in the woods. Trees containing much sap in the butt log may be cut with very high stumps or the first log may be "long-butted", that is, a piece from four to fourteen feet in length is cut off the butt end and left in the woods. Long butting is also commonly practiced by independent loggers in timber affected by stump rot for the purpose of raising the grade of their logs.

Editor's Note—This is the first installment of "Logging Waste in the Douglas Fir Region" by Mr. Hodgson, the complete report of which is being published in this journal. The second installment will appear in an early issue.

Methods Used in Making The Survey of Logging Waste

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Editor's Note—This is the second installment of "Logging Waste in the Douglas Fir Region" by Mr. Hodgson, the complete report of which is being published in this journal. The third installment will appear in an early issue.

THE SURVEY

WHEN the survey of logging waste in the Douglas fir region was started there was no former experience to follow in this particular line of work. It was largely a pioneer undertaking in which methods had to be developed, and this was at times difficult. The industry has no definite and common standards of utilization. Such as it has are general. In most cases the height of stumps, the amount of rot or other defect permissible in merchantable logs, and the mini-

mum dimensions of logs to be left in the woods seem to depend largely upon the personal ideas and care of the logging superintendent or logging-camp foreman. Wide differences in utilization not only exist between companies, but also in the work of individual logging crews working under different foremen but under the same management. All of this made it difficult to set up standards for the survey.

METHODS USED IN THE SURVEY

Before the field work was started, the logging operations of a number of companies in different parts of the region were visited and the views of many men in the industry were sought for the purpose of determining the best ways of conducting the



A DOUGLAS FIR FOREST AFTER LOGGING

Brubaker Aerial Photo, Portland

This is a bird's-eye view of a logging operation which is practically completed. The smoke indicates the location of three logging engines with railroads running by them. About 200,000 acres are logged off in this way annually. Note also

the small patches of standing timber at the right, which have been left because of not being in convenient reach. Such timber is inevitably lost through subsequent slash burning or blowdown. Waste of this type is heavy but difficult to compute.



A "YARDING SIDE" IN THE DOUGLAS FIR REGION
In the foreground is a steam skidder, with steel tower. This unit is used for yarding and loading logs. The four men standing just in front of the machine furnish a basis for size comparison.

work. A working plan was then prepared, submitted to several members of the industry for criticism, and finally adopted as a guide for the study.

Out of the large number of logging companies, 24 representative operations located at various points within the region were chosen for intensive study. A few of these were small outfits, but most of them were comparatively large, their combined yearly output representing nearly one-fourth of the logs produced in the region. Thirteen of the companies were logger-manufacturers, eight were independent loggers, two were independent loggers (except for the operation of hemlock sawmills), and one was a pulp and paper company which logged its hemlock and spruce timber for pulping purposes selling the logs from other species. These companies were selected so that most of the principal producing districts would be represented, the majority being from those districts producing the greatest volume of logs. This distribution, graphically shown on the preceding map*, was made as follows: Puget Sound 9, Grays Harbor 3, Willapa Harbor 2, Columbia River 4, Willamette Valley 3, and Coos Bay 3.

The sample-acre plot was chosen as the area unit for intensive study. In the progress of work on the logged-off lands of a given company several plots were located within selected yarding sides.³ This was done after the entire operation had been looked over for yarding sides representing average logging waste conditions, keeping in mind the type and volume of timber before logging, ground conditions, etc. Altogether 150 sample-acre plots, an average of 6.25 plots per company, were located on the ground and intensively studied.

Measurement of Material

The location of all plots and the measurement of material left thereon were, in all cases, done after the logging operation was completed and before the slash was burned.

All sound timber down to and including cordwood size found upon the sample plots were measured for length, small end diameter, and middle or average diameter. Rotten logs were not measured unless the defective portion were located in such a way as to make practicable the saving of sound wood by cutting out the defect. When partially-rotten logs were measured liberal allowance for the defect and the accompanying waste to be expected in sawing it out, or working it into cordwood, was deducted. Pieces of wood that were so small, crooked, knotty, shattered, or affected by other defect as to have very little poten-

*A "yarding side" is the area from which the logs are yarded or skidded to one point on the railroad by a single setting of the yarding equipment. Its average area for the high-lead method of logging is 25 or 30 acres and for the skyline or skidder method 150 acres or more.

³The map referred to was published in the preceding installment.

tial value for pulp, or fuelwood of cordwood size, were not measured.

The average height and diameter of every stump, snag and tree (knocked down or left standing), down to a stump diameter of six inches, found on the sample plot was measured as was also the slope of ground at the base of each. These measurements, with those spoken of in the preceding paragraph were used in arriving at the amount of waste wood that was left on the ground. The diameter measurements of stumps and trees, together with observations regarding defect and the average height of trees before they were cut, as indicated in similar nearby stands, also formed the basis for reconstructing the original stand of timber⁴. At the time the volume of this stand was computed a discount was made for defect which ranged from zero to 45 per cent, depending upon conditions.

When the stumps were measured data were taken for determining the volume of wood left in the form of excessive stump heights. The measurements were made after logging had taken place and therefore the presence of obstacles to the cutting of low stumps, such as windfalls and thrown timber could not always be accounted for but it was assumed that the man doing the measuring was well enough informed on felling conditions and practices to know with reasonable accuracy at what point on the tree the falling crews should have placed the cut which resulted in the stump. In determining this point, due allowance was given to such things as burls, taper and defect, and ground conditions. Each stump was given individual study and when the point at which the tree should have been cut was determined the difference between this point and the actual height of the stump represented the excessive stump height or wood loss. The volume of the waste wood found in excessive stump heights was computed in this way: Volume of a 16-foot log measured 16 feet up from the top of stump subtracted from the volume of a similar log with the waste length in the stump added to it equaled the waste wood in the stump expressed in feet, board measure. Curves showing the taper of average trees were used in arriving at the correct small end diameters of these logs. The Scribner Decimal "C" log rule was used in the determination of the contents of the logs.

A Scribner Decimal "C" log rule scale stick, graduated to inches and feet, was used in the field for measuring diameters and lengths of all waste material. This stick was also used in taking measurements of stumps, and for estimating the height and diameters of remaining snags and trees. The field work was done by a crew of two men, and in order to eliminate the personal equation, all measuring throughout the study, so far



DOUGLAS FIR STUMPS

Stumps as high as these are now exceptional in the region but the survey indicates that as an average stumps are yet cut too high. (Columbia River region.)

as practicable, was done by the same man, the other one acting as tallyman.

The location of sample-acre plots as well as general and de-

⁴By the application of specially-prepared taper curves (based on measurements made by Dr. J. S. Boyce U. S. Bureau of Plant Industry) and Forest Service "local" volume tables it was possible to reconstruct the original stand of timber from the stump measurements and other data taken in the field, and to compute its volume for each sample-acre plot.



"JACK-STRAW" LOGGING WASTE

It is difficult to gain a satisfactory idea of the character and volume of logging waste in such a tangle by simply looking it over. Many of the down trees shown are western hemlock of excellent pulpwood size.

scriptive information concerning them was entered on prepared forms and the measurements of wood found upon the ground were entered by tree species on tally sheets. At the same time the wood was measured and tallied each piece was described and graded into one of several classifications.

Classification of Material

The measured material was classified into sawlogs, poles, shingle bolts, fence posts, cordwood (pulpwood, fuelwood) and waste in stumps in accordance with the following specifications.

Sawlogs

The larger and better material of all species was classified into sawlogs. For the purpose of this study sawlogs were graded into three classes, but these did not correspond to the three commercial log grades used in the Douglas fir region. They were chosen arbitrarily upon the basis of size of logs that are now being used in other regions and which might some day be used in the Douglas fir region.

The minimum dimensions used in dividing the logs into one of the three classes were as follows:

Log Class	Diameter Small End Inches	Length Feet	Gross Scale* F.B.M.
1	9	38	130
1	10	32	120
1	11	26	110
1	12	20	100
1	13	18	110
1	14	15	120
1	15	15	130
1	16	14	140
2	9	28	70
2	10	16	60
2	11	16	70
2	12	16	80
2	13	15	90
2	14	14	100
3	6	27	40
3	7	16	30
3	8	14	20
3	9	12	30
3	10	10	30

The low minimum requirements of Class 1 sawlogs resulted in only the smaller logs being thrown into the No. 2 and No. 3 classifications. There were many small sticks whose size would have qualified them under the minimum requirements as Class 2 or Class 3 sawlogs but which because of defect such as rot or roughness, were tallied as cordwood or not counted at all. It was recognized that small pieces in order to be of

potential value as sawlogs must be sound, straight and reasonably free of large knots. For this reason all of the material classified as Class 2 or Class 3 sawlogs was sound as was also the smaller pieces, up to 16 or 18 inches in diameter with a length of 20 or 30 feet, which were graded as Class 1 sawlogs.

The Class 1 logs were represented by a much wider variation in dimensions. From the smallest sizes, represented by the minimum dimensions as tabulated above, the Class 1 logs ranged up to very large sizes. The larger ones were usually logs that had been culled or accidentally overlooked by the yarding crews.

Some defect such as rot, stain, wormy sapwood and large knots was permitted in the classification of the larger Class 1 sawlogs, but a liberal deduction for such defects was made in all cases, the final figures representing only sound wood suitable for lumber. The amount of defect permissible in a given log depended upon the size and character of the log and the character of the defect.

The larger logs were roughly divided into two types, smooth logs which would cut out a high percentage of clear lumber and rough logs, containing large knots or other such inherent defects, which normally lower the grade of lumber. Some of the top logs were so knotty and rough as to make them unsuitable for sawlogs of any class and so were counted as cordwood material. Others of better grade, although carrying in many cases defect were listed as Class 1 sawlogs. The amount of defect in the form of rot and stain allowed in the rough Class 1 logs ranged from 1 per cent up to a maximum of 30 per cent of the gross volume. In the large, smooth Class 1 logs, rot and stain ranging from 31 per cent to 60 per cent of the gross volume was permitted.

Shingle Bolts

Western red cedar and in certain localities Port Orford cedar and incense cedar are commonly found in mixture with the other trees of the region. These cedars, particularly after they have passed maturity, are frequently partially rotten and hollow-butted which results in the outside shell of clear sound wood splitting into slabs when the trees are felled. On some logged-off areas these slabs, which could not be treated as sawlogs, were found in considerable quantity and, when sufficiently free from knots and other defects to make possible the manufacture of merchantable shingles, were classified as shingle bolts. Also some cedar in the round, when pieces had been broken into lengths too short for sawlogs, were thrown into this class. It was recognized that shingles from Port Orford and incense cedar are not made in commercial quantities and as far as these two species are concerned the shingle-bolt classification was an arbitrary one. However, the amount

*Scribner Decimal "C" log rule was used to convert sawlogs into board feet, the diameter at small end and length of log being given.



TWO WASTE SOURCES
Western hemlock stump cut too high. Western hemlock tree pulled over and left. (Puget Sound Region.)

of wood from these two cedars listed as shingle bolts, when compared with western red cedar, was very small.

Poles and Posts

There was also found in most parts of the region scattered western red cedar and in some localities Port Orford cedar and incense cedar trees of younger age classes. Many of them had the right dimensions and qualities for telephone and telegraph poles. If such timber had been found by the logger in sufficient quantities to justify a pole logging operation no doubt they would have been logged for this purpose; however, only a few such trees per acre were found. Since it was not profitable to segregate the comparatively few trees and being too small for commercial logs, they were usually not taken out. When such trees were found by the survey they were classified as poles⁹ since their value would have been higher in this form than as sawlogs.

There were also found scattered through the slash, still smaller trees of these cedar species, which were too small to be classed as either logs, poles or shingle bolts. They could have been thrown into the class of pulpwood or fuelwood, but although it was recognized that no large companies in the Douglas fir region were taking out fence posts, it was decided to classify suitable material as such. This was done simply as a convenience for classifying data and for the reason that the classification was descriptive of the material. In addition to the small round cedar there was some slab material too small for shingle bolts that was classed as fence posts.

Cordwood

Cordwood, as referred to in this study, was sound material that could not qualify under the classifications mentioned above. Cordwood as commonly thought of is either in the round, or split into pieces small enough to be handled by one man and which can be corded into piles 8 feet by 4 feet by 4 feet. Its size makes it suitable for fuelwood or pulpwood in lengths of four feet. The minimum dimensions used for cordwood in the round (the smallest pieces of wood included), was taken as 4 feet long and 4 inches in diameter, inside bark, at the small end. In this study cordwood was divided according to species and suitability into pulpwood or fuelwood.

Pulpwood

All cordwood suitable for paper pulp was listed as pulpwood⁷. This material had to be sound and free from rot since wood with this defect reduces the yield and quality of pulp and is unusable. The species represented by this material were principally western hemlock, "white" fir, and some Sitka spruce.

Fuelwood or Pulpwood Suitable for Kraft Paper

All other cordwood, including small pieces as well as large logs not suitable for any of the other classifications but which could be sawed and split into proper dimensions, was classed as fuelwood⁷. It is suitable for fuel or the manufacture of kraft paper. The material was made up chiefly of Douglas fir with very small amounts of western red and Port Orford cedar, western white and sugar pine.

⁹The manufacturing specifications for poles common to the region were used in deciding whether the material qualified as poles. The Scribner Decimal "C" Log Rule was used to convert poles into the common unit of feet board measure.

⁷Table 4.—"Solid Cubic Contents of Logs, Instructions for the Scaling and Measurement of National Forest Timber, 1916" was used to convert pulpwood and fuelwood into cubic feet.

Conversion Factors and Averaging Results

In stating the results of the survey it might have been better to have used the commonly accepted terms for describing such material. The tabulations were complicated and required considerable space, so for simpler comparisons, the volume of all measured and graded wood in the different classes is given in board foot measure. Such measure, if desired, may be readily changed by use of the following converting factors:

Shingle Bolts: 1 shingle bolt=16" x 16" x 52'=3.37 cu. ft.
=20.16 F.B.M. (1,000 ft. b.m.=10,000 shingles, 4-inch width).

Poles: Assume the average size of a pole to be 6" top diameter and 60 feet long which equals 100 F.B.M.

Posts: Assume the average size of a post to be 6" top diameter and 7 feet long which equals 7 F.B.M.

Pulpwood and Fuelwood—One cu. ft. (round)=6 F.B.M.
500 F.B.M.=one cord.



White fir logs left on the ground as waste in the Coos Bay region. In some cases ninety per cent of this waste was in the form of white fir trees bucked into logs to facilitate getting out the more valuable lumber species.

As previously mentioned, 150 sample-acre plots, located on the operations of 24 companies, within the boundaries of six production districts, were intensively studied. It was assumed that these areas represented average conditions. Since the number of sample plots taken was not the same for each company, or production district, it was necessary in order to arrive at true averages for comparison purposes in the tables, first to average the findings for each individual company. The companies within each district were then grouped and district averages obtained and these were in turn averaged for the region as a whole.

Findings of the Survey

Telling How Much Logging Waste Was Found and How It Was Classified

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Editor's Note—This is the third installment of "Logging Waste in the Douglas Fir Region" by Mr. Hodgson, the complete report of which is being published in this journal. The fourth installment will appear in an early issue.

FINDINGS OF THE SURVEY

Estimate of Logging Waste for the Region

AN estimate, reached by comparing the actual results of the study with the total timber cut in the region, shows that the annual accumulation of material of cordwood size or larger, now being left unused after logging in the Douglas fir region amounts to considerably more than 3,000,000,000 feet log scale, or more than 6,000,000 cords of sound wood. This figure becomes significant when one realizes that in footage it is equal to almost one-tenth of all the lumber annually produced from domestic timber in the United States. As a further comparison, it may be noted that in 1926 the total pulpwood cut in the United States was 5,489,517 cords.

More than one-third of this amount of unutilized wood—1,146,276,000 feet or 2,292,552 cords—is western hemlock, Sitka spruce and true or "white" firs, woods in demand for sulphite and mechanical paper pulp. The balance—1,942,472,000 feet or 3,884,944 cords—is Douglas fir, western red cedar, and other species such as Port Orford and incense cedar, sugar, western white and yellow pine, woods with high values for lumber but low pulping properties, at least when reduced by present commercial practices. More than one-half of all the logging waste—1,626,547,000 feet—is Douglas fir.

More than one-third—1,354,828,000 feet—of all the unused wood found in the region was within the Puget Sound district. This is largely due to the great size of the district, to the activity of the lumber industry within it and to the fact that a considerable percentage of its timber is western hemlock, a species having at present a relatively low commercial value for sawlogs. For much the same reasons, one-fourth—781,615,000 feet—of all of the logging waste is found in the Columbia River district.

In treating a subject so variable as the amount of unutilized wood in the logging operations of the Douglas fir region, it is difficult to give accurate averages or totals for the entire region. Among the first questions one who is interested may ask are those pertaining to the total quantity of waste wood, the tree species represented, and the general locations in which such

waste is found. In Table 2 an attempt is made to answer such questions; these figures are based upon the actual results of the survey with other data, which was available, such as the annual timber cut, etc.

In Table 3 is shown the total estimated quantity of material left after logging by the classes of material set up for the study. As in Table 2, the table is based upon the total annual timber cut for the region, to which was related the actual findings of



DISCARDED WESTERN RED CEDAR OF POLE SIZE

Unless such trees occur in large numbers so as to justify a pole logging operation they are unprofitable to handle and so scattered individuals are likely to be left in the woods.

the survey. The items in Table 3 are expressed in terms of feet board measure, the common unit of measurement, but when the volumes of the various commodities are stated in the units of measurement commonly used, it will perhaps be easier to realize the character of the material which makes up this logging waste.

To change log scale to lumber tally, it is found, by adding five per cent for over-run, that the material contained in the three classes of sawlogs amounts to 1,557,702,000 feet b.m., while the lumber which could be cut from the Class 1 logs

TABLE 2—Estimated Quantity of Wood, Cordwood Size and Larger, Annually Left After Logging in the Douglas Fir Region by Producing Districts¹

District—	Douglas Fir	Western Hemlock	"White" Firs	Sitka Spruce	Western Red Cedar	Other Species	Total
	M ft. b.m.	M ft. b.m.	M ft. b.m.	M ft. b.m.	M ft. b.m.	M ft. b.m.	M ft. b.m.
Puget Sound	514,835	569,028	5,419	40,645	219,482	5,419 ³	1,354,828
Columbia River	531,498	203,220	1,563	10,161	33,610	1,563 ³	781,615
Grays Harbor	145,871	143,008	—	11,733	15,855	634 ³	317,101
Coos Bay	72,928	9,169	36,361	18,971	1,265	19,397 ⁵	158,091
Willamette Valley	283,277	18,509	4,078	—	6,598	1,255 ⁴	313,717
Willapa Harbor	17,368	20,567	—	3,457	1,815	—	43,207
Other Districts ²	60,770	16,668	17,314	16,405	947	8,085 ⁶	120,189
Total	1,626,547	980,169	64,735	101,372	279,572	36,353	3,088,748

¹Estimate includes material of cordwood size and larger, basis of log-scale measure; arrived at through relating the actual survey data to the total timber cut of the production districts of the region. It necessarily represents only a rough approximation of conditions in the entire region.

²Toledo-Tillamook, Umpqua River and Southern Oregon—Districts in which no sample plots were located by the survey.

³Western white pine.

⁴Sugar pine, western white pine and incense cedar.

⁵Port Orford cedar.

⁶Western yellow pine, sugar pine, western white pine and incense cedar.



Exceptionally good
DOUGLAS FIR LOGS
Ready for shipment.

As a rule it costs more to transport defective or low-grade logs over railroads than it does high-grade, sound ones such as these, and the comparative returns are considerably less.

alone is 1,115,655,000 feet b.m., about half of which, 505,941,000 board feet, is Douglas fir. In addition to the lumber which could be sawed annually from the three classes of sawlogs, 231,563,000 feet could, if added to the butt logs, be made from the excessive stump heights, which usually contain a higher grade of material than does most of the other logging waste. This makes a total of 1,789,465,000 feet b.m., or about one-sixth in footage, of the total regional 1926 lumber cut, which was 10,229,820,000 feet.

It is estimated that the pulpwood from material too small or unsuitable for sawlogs, as listed in Table 3, would make 668,974 cords from western hemlock and "white" fir and 86,534 cords from Sitka spruce, or a total for the three species of 755,506 cords. As shown by Table 1 the total annual timber cut in the region for pulpwood amounts to 484,032 cords. Most of the pulp manufactured on the Pacific Coast at the present time is made from these three species although a little Douglas fir wood is also used. If economical processes for making suitable kraft and white paper from Douglas fir should be perfected, more of this species would be used by the pulp mills. In such an event there is a great deal of Douglas fir logging waste too small or unsuitable for sawlogs which would be available for pulp making as is shown in Table 3. This material, listed here as fuelwood, amounts to 1,674,102 cords. Such material as cedar poles and posts may some day also be of value as pulp material which would add 141,464 cords to the potential supply from logging waste. A total of these figures shows that a possible supply of 1,815,566 cords of pulpwood, in addition to the hemlock, white fir and spruce listed in the table as pulpwood, could be derived annually from the logging waste of the region without using material that is suitable for lumber or for shingle bolts.

The cedar logging waste shown in Table 3 as shingle bolts,

poles and posts, totaling 169,881,000 feet b.m., is suitable for making 4,914,103 shingle bolts (nearly ten million shingles), 176,000 poles and 7,589,429 posts.

An analysis of the total annual wood loss of 3,088,748,000 feet b.m. shown in Table 2, and classified in Table 3, shows that more than one-third, or 1,062,529,000 feet b.m., is in the form of Class 1 sawlogs, the bulk of which under slightly improved economic conditions the industry could reasonably be expected to use for lumber; at least 90 per cent of these logs were well within or above the specifications of commercial log grade No. 3 as provided for Douglas fir¹ by the Puget Sound Log Scaling and Grading Bureau. A little less than one-half, 480,623,000 feet, of the Class 1 logs are western hemlock, "white" fir and Sitka spruce, woods of interest to the west coast paper pulp industry since it depends largely upon these species for its raw material. Most of these logs are western hemlock since that species is found generally throughout the region while Sitka spruce grows only near the coast. The white firs are found in certain localities on relatively low land near the coast and in the higher mountains, but only a few logging operations are working at present in timber containing many of these trees. The balance of the Class 1 logs, 581,906,000 feet, are Douglas firs, cedars and pine, 481,849,000 feet of which is Douglas fir.

¹No. 1 logs shall be logs which, in the judgment of the scaler, shall be 16 feet in length and up, suitable for the manufacture of lumber in the grade of No. 2 Clear, or Better, to an amount of not less than 50 per cent of the scaled contents. No. 2 logs shall be not less than 12 feet long and having defects which prevent its grading No. 1, but which, in the judgment of the scaler, will be suitable for the manufacture of lumber, principally in the grades of Merchantable and Better. No. 3 logs shall be not less than 12 feet long and having defects which prevent its grading No. 2, but which, in the judgment of the scaler, will be suitable for the manufacture of Common lumber.

TABLE 3.—Estimated Quantity of Wood, Cordwood Size and Larger, Annually Left After Logging in the Douglas Fir Region, by Classes of Material¹

Classification	Douglas Fir	Western Hemlock and "White" Fir	Sitka Spruce	Western Red Cedar and Other Species ²	Total
Sawlogs—	M ft. b.m.	M ft. b.m.	M ft. b.m.	M ft. b.m.	M ft. b.m.
Class 1	481,849	449,710	30,913	100,057	1,062,529
Class 2	39,536	105,944	—	5,251	150,731
Class 3	127,257	123,859	6,177	12,973	270,266
Total Sawlogs	648,642	679,513	37,090	118,281	1,483,526
Excessive stump heights	140,854	30,904	21,015	27,763	220,536
Pulpwood	—	334,487	43,267	—	377,754
Fuelwood	837,051 ³	—	—	—	837,051
Shingle bolts	—	—	—	99,149	99,149
Poles	—	—	—	17,606	17,606
Posts	—	—	—	53,126	53,126
Total	1,626,547	1,044,904	101,372	315,925	3,088,748

¹Estimate includes material of cordwood size and larger, basis of log scale measure; arrived at through relating the actual survey data to the total timber cut of the production districts of the region. It necessarily represents only a rough approximation of conditions in the entire region.

²Western white, yellow and sugar pine and Port Orford and incense cedar.

³Includes western white, yellow and sugar pine in quantities too small to segregate.

Table 4. - Quantity of Material Left in the Woods After Logging in the Douglas Fir Region Compared with Timber Felled and Volume of Original Stand

(Feet Board Measure Per Acre)¹

Volume of Original Stand										Timber Felled in Logging					Timber Left in Woods								
Districts and subdivided	No. of logging camps	No. of trees	Douglas fir	Western cedar	Sitka spruce	White ² fir	Other species ²	Total	Douglas fir	Western cedar	Sitka spruce	White ² fir	Other species ²	Total	Douglas fir	Western cedar	Sitka spruce	White ² fir	Other species ²	Total	Based on timber felled	Based on original stand	
Puget Sound	1	9	51,500	20,990	5,686	6,116	1	84	92,614	50,541	25,616	5,618	1,604	1	24	86,071	8,464	9,577	791	1,014	19,646	22.8	21.2
			21	54	4	1	1	1	79	18	25	5	1	1	1	41							
			2,456	537	1,471	6,116	1	1	1,172	2,808	945	1,243	6,042	1	1	2,099							
Grays Harbor	1	2	92,362	39,592	10,660	16,842	1	27	135,085	69,272	35,255	10,393	13,945	1	1	139,572	10,572	9,909	935	1,298	22,714	17.5	16.8
			10	51	5	2	1	1	66	10	24	4	2	1	1	41							
			6,928	775	2,132	7,421	1	1	1,985	6,598	1,469	2,698	5,272	1	1	5,160							
Willapa Harbor	1	2	100,189	52,195	1,611	1	1	12	145,166	108,189	28,186	1,771	1	1	1	136,116	9,377	9,947	-	181	19,806	14.3	13.6
			18	41	1	1	1	1	59	18	16	1	1	1	1	37							
			6,092	692	1,611	1	1	1	2,411	6,099	1,455	1,771	1	1	1	3,678							
Columbia River	1	4	92,798	26,043	2,983	3,315	289	25	125,440	92,653	32,290	2,280	3,277	1	1	121,615	19,224	7,416	115	1,201	27,982	25.0	22.3
			27	33	5	1	1	1	66	26	17	4	1	1	1	47							
			3,437	790	596	3,315	289	1	1,900	3,563	1,340	682	3,277	1	1	2,367							
Willamette Valley	1	2	68,385	1,609	801	1	1	16	72,224	67,155	1,435	1,728	1	1	1	71,034	14,481	971	-	854	16,006	22.7	21.9
			43	7	2	1	1	1	55	38	4	2	1	1	1	45							
			1,590	253	400	1	1	1	1,900	1,326	374	564	1	1	1	1,658							
Coos Bay	1	3	56,679	3,004	2,034	1	1	16	61,041	56,564	1,764	1,751	1	1	1	60,859	9,495	10,877	-	2,246	22,616	26.0	26.9
			34	10	2	1	1	1	63	30	3	1	1	1	1	46							
			1,567	808	1,018	1	1	1	1,624	1,555	554	1,751	1	1	1	1,787							
Total	1	24	74,997	22,125	4,046	2,877	1,206	11	100,879	74,075	30,514	3,865	3,881	1	1	104,208	11,984	6,084	507	1,032	21,407	20.55	19.66
			69.6	20.3	3.7	2.6	1.1	1	100.0	66.2	17.0	3.5	3.6	1	1	96.6	11.0	7.4	0.3	1.0	15.66		
			1	25	35	3	1	1	65	23	15	2	1	1	1	44							
			2,984	670	1,243	4,046	1,206	1	1,675	3,221	1,254	1,932	3,881	2,749	1	2,878							

¹ Fractional board feet dropped. ² Small amounts of Port Orford cedar, incense cedar, western white pine and sugar pine. ³ Per Cent of original stand.⁴ Per Cent based on volume of individual species in original stand.

Detailed explanation of this table is given by Mr. Hodgson in the succeeding installment entitled "Logging Waste As Actually Found by the Survey."

A typical logging camp in the Douglas Fir Region of the Pacific Northwest.



Table 5.— Quantity and Character of Material Left in the Woods After Logging in the Douglas Fir Region
(Feet board measure per acre)¹

Districts logging studied	No. of camps	Sawlogs										Not suitable for sawlogs										All material left ²																																																																																																																																																																																																																																																																																																																																							
		Class I ³					Class II ³					Class III ³					Pulp- wood, bolts, live timber, etc.					Total																																																																																																																																																																																																																																																																																																																																							
		Western hemlock fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western hemlock fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western hemlock fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir	Western cedar fir

¹ Fractional board feet dropped. ² Cordwood size and over. ³ Working plan classification and not commercial log grades. ⁴ Also potential material for sulphate pulp, charcoal, etc.

⁵ Small amounts of western red cedar, Port Orford cedar, incense cedar, western white pine, and sugar pine. ⁶ Per Cent based on total waste.

Detailed explanation of this table is given by Mr. Hodgson in the succeeding installment entitled "Logging Waste As Actually Found by the Survey."

Logging Waste

As Actually Found by the Survey

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Editor's Note—This is the fourth installment of "Logging Waste in the Douglas Fir Region" by Mr. Hodgson, the complete report of which is being published in this journal. The fifth installment will appear in an early issue.

Logging Waste as Actually Found by the Survey

THE preceding pages have presented the logging waste in the Douglas fir region from the standpoint of the region as a whole. On the following pages are described the actual conditions found on the operations of the 24 companies intensively studied, in the progress of the survey.

Table 4 shows the quantity of material left in the woods after logging and this is compared with the volume of the timber felled and the volume of the original stand, by species and districts. It will be noted that as a general average 21,407 feet b.m. per acre of sound material, cordwood size and larger, are left on the ground as logging waste—this consists of 11,934 feet of Douglas fir, 8,084 feet of western hemlock and white fir, 307 feet of Sitka spruce and 1,082 feet of western red cedar and other species. This unutilized wood is equal to almost one-fifth of the original stand of timber. In many parts of the world a forest averaging 21,000 feet b.m., or 42 cords, of wood per acre would be considered as a very heavy stand of timber.

Editor's note—Of the tables referred to in this installment, 4 and 5 appeared in the preceding installment and table 9 appears in the next installment.

In addition to the material included in Table 4, it is estimated that about 7 per cent in volume of the original stand is left in the form of badly-shattered logs, small tops and slabs, short pieces, logs containing large numbers of very big knots and very crooked logs, material which, it was assumed, had no potential value and which was not included in the survey measurements.

The last vertical column in Table 4 represents the comparative closeness of utilization based on per cent in volume of the original stand of timber in the six districts studied. The variation in the amount of material left in the woods of the different districts, at least as shown by the survey, is quite noticeable.

Large differences were also noted between companies. For example, in the Coos Bay district, one company was leaving on the average two-fifths in volume of the original timber stand as waste, while another company in the same district was leaving but one-tenth. It so happens that these two companies represent the two extremes, in point of quantity of waste material left as covered by the survey. On some exceptional sample-acre plots as much as 75,000 feet b.m., or three-fourths of the original stand of timber, was left, while in other cases the unutilized material amounted to only 6,000 or 8,000 feet b.m. per acre, or only about one-tenth in volume of the original stand.

Referring again to Table 4, it is shown that under the heading "Volume of Original Stand" that 68.6 per cent of the aver-



EXTREMELY ROTTEN TIMBER LEFT IN THE WOODS
Such material could not be classified as waste since it contained practically no sound wood.

age original timber is Douglas fir, but in number of trees it is represented by 38.5 per cent only. Western hemlock makes up in volume 20.3 per cent of the stand, but in number of trees this species is represented by 50.8 per cent, a little more than one-half of all the trees. The volume of the average Douglas fir tree is nearly 3,000 feet while that of the average western hemlock is but 670 feet. The difference in size and value of these species of trees and their growing together in a forest which is clear-cut present conditions conducive to logging waste in the small less-valuable trees.

Broadly speaking it is apparent that utilization by the pulp mills of sawlogs, cordwood, mill and factory trimmings, pulp chips converted from sawmill and factory waste, and logging waste does not constitute competition to the lumber producer but rather co-ordination in greater utilization of wood.

The stands of timber covered by this survey measured to a six-inch diameter breast high averaged nearly 109,000 feet per acre.⁹ This figure is typical of the timber that is actually being logged. If based on expansive areas, which would naturally include small openings in the forest, water surfaces, and stands of small second-growth timber and not usually logged, and if the measurements were made only down to an 18-inch diameter breast high, which is the customary practice in cruising, the average commercial stand would run much less than 109,000 feet per acre.

Under the heading "Timber Felled in Logging" Table 4 brings out that of the total original stand, 95.8 per cent of the volume of the timber was felled, but in number of trees only 66.2 per cent. With the exception of western hemlock practically all of the trees were cut for logs. In the case of hemlock only 45.4 per cent of the total number of trees was considered of enough value to cut for logs. The felled hemlock trees were of the larger diameter classes; in volume their contents measured 83.6 per cent of the hemlock timber. The trees that were left were either pulled down in the process of logging and left as a part of the slash or they remained standing to be killed by the slash fires.

The average of all the sample-acre plots studied, as noted by Table 4 bore 63 trees, only 44 of which were large enough or sound enough to cut under present practice.

Owing to the "jack straw" condition of the waste wood left

⁹This figure is the net volume since an allowance for defect was deducted from the gross volume found on each sample-acre plot.

after logging in the Douglas fir region, it is a difficult matter for the average interested person to look over such an area and gain a clear idea of the kind and number of individual pieces. A further analysis of the waste material as found by the survey is therefore given in Tables 5, 6 and 7.

Table 5 simply takes the total logging waste as presented in Table 4 and breaks it down, by species, into the various classes of material recognized by the survey.

Of the total amount of waste shown by the table, which amounts to 21,407 feet b.m., practically one-half is classed as sawlogs while the balance is described as "not suitable for sawlogs".

Of the 10,659 feet of sawlogs per average acre, 7,735 feet is shown as Class 1, 1,043 feet as Class 2 and 1,886 feet as Class 3. Of the Class 1 logs, 3,667 feet is Douglas fir, 3,731 feet is western hemlock and white fir, only 92 feet is Sitka spruce, and but 245 feet is western red cedar and other species.

The 10,748 feet classed as "not suitable for sawlogs" includes 2,542 feet of pulpwood, 6,311 feet of fuelwood, or potential pulpwood, 530 feet of cedar shingle bolts, poles and posts, and 1,365 feet of material in excessive stump heights.

The analysis of waste wood based on the volume of the individual species has been carried farther in Table 6 which not only shows the general average included in the last vertical column of Tables 4 and 5, but also shows the relative character of utilization by species in the six production districts studied.

Table 6 shows that, as an average for the region, based on the quantity of individual species in the original stand, utilization is best in the case of Sitka spruce, where the waste in this species amounts to only 7.6 per cent. Utilization of Douglas fir is next best with a waste of 16.0 per cent. This is followed by western red cedar and other species, with waste amounting to 20.7 per cent. In western hemlock and white fir the waste of 32.3 per cent shows that utilization in logging these two species is the poorest of all. Utilization is no doubt better in Sitka spruce because the wood is in strong demand for box shooks and for paper pulp, for which purposes both small and short logs are usable, and since the quantity of Sitka spruce is not great, it is as a rule cleaned up very well.

Had the survey included no material smaller than a shingle bolt, the utilization for western red cedar would have shown up better in the table, as western red cedar of shingle bolt and larger size is usually cleaned up comparatively well. When they are felled the character of the older western red cedar trees and the natural heart defect common in this tree, however, often cause them to shatter and break into small pieces, many of which are too small for shingle bolts, but are large enough to get into the cordwood or post classes.

Table 7 shows that on the average acre of logged-over land there were 144.7 pieces of sound wood (not including excessive stump heights, standing trees and snags) large enough to be included in the survey. Their average volume was 116.2 feet b.m. Of this total there were 58.3 pieces with an average volume of 159.4 feet classed as "sawlogs" and 86.4 pieces with an average volume of 87.2 feet listed as "not suitable for saw-



**A DOUGLAS FIR
"LONG BUTT"**

This butt cut was left in the woods because of "stump rot", "wind shake" and "pitch rings", defects which if left on the log would reduce its grade from a No. 1 to a No. 2 or a No. 3 log.

DAMAGE TO TIMBER FELLED ON BROKEN GROUND

Logging on broken ground is accompanied by much breakage such as that illustrated here.



logs". Falling under the sawlog classification there were 20.5 pieces listed as Class 1 sawlogs with an average volume of 313.0 feet.

Under the heading "Description of Pieces", Table 7, an attempt has been made to use terms that will help the reader to visualize the character of material described. Each piece of logging waste measured in the study was tallied by species under one of these descriptive headings.

The table lists "logs" under five headings. "Logs—unbroken, sound, bucked at both ends" were perfect logs, prepared by the buckers for yarding, which had been overlooked or intentionally left by the yarding crews on account of their size and species, or because located in difficult places. It will be noted that there was a total of 6 4/10 of such pieces left per acre, classified by the survey as sawlogs. Of these 3.2 with an average volume of 390.6 feet b.m., were Class 1 logs. It is of interest to note that this volume, which did not enter into the calculation, agrees very closely with the estimated volume of the average minimum log taken out of the woods by the loggers (see page IV).

Some operators, with a system of supervision giving individual responsibility, have fostered an appreciation of timber values in their employees; these operators recognize that high production is a measure of efficiency but hold it secondary to the best possible utilization of the timber.

"Logs—culled for defect, bucked at both ends" were represented by a total of 1 1/10 pieces per acre, sound enough to be tallied. There were many more such logs on the ground, but because of their excessive rot or other defects were not included in the survey.

"Logs—broken at both ends, not bucked", with a total number of 44.2 pieces and an average volume of 118.4 feet, shows up the greatest numbers. Most of these were due to breakage in felling the trees and sometimes in yarding. They consisted of comparatively long, sound lengths of timber between two breaks. There were 14.5 "Logs broken at one end, one end bucked" with an average volume of 239.5 feet. Some of these were broken in yarding, one end having been snapped off by the choker. Others were broken by felling trees across them after they had been bucked in preparation for yarding, the two ends becoming separated. In other cases these broken logs were the result of leaving too much length when breaks in fallen trees were bucked out.

"Logs—broken in the middle, both ends bucked" were relatively few in number. In most cases they were logs in place

which had been prepared by the buckers for yarding but had been broken by felling other trees across them. Usually the original log was quite long and the break was square across it so that two comparatively good logs could have been taken out. Sometimes the break was near one end and in such cases one very satisfactory log could have been salvaged. It will be noted that such pieces, classified as sawlogs, contained an average of 850.0 feet.

In this day of applied science, it is reasonable to believe that sooner or later not only profitable uses but economical methods of logging and manufacture will be found for at least a considerable proportion of the logging waste of the region.

Table 7 divides tree tops into two descriptive classes. "Tops—large end bucked" represented the material above the top log which was considered too small or too rough to utilize. There were seven of these with an average volume of 58.3 feet. The tops of most of the trees were broken when the trees were felled and generally the point where the top was broken out, when squared up, represented the small end of the last, or top log, taken out of the tree. The "Tops—broken at large end, not

TABLE 6—Quantity of Logging Waste by Species, Expressed in Percentage of Volume in Original Stand¹

District—	Douglas Fir	Western Hemlock and "White Fir" ²	Sitka Spruce	Western Red Cedar and Other Species ³	All Species in Original Stand
Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Puget Sound	16.4	32.3	12.9	17.1	21.2
Grays Harbor	15.1	25.0	6.3	12.2	16.8
Willapa Harbor	8.7	30.0	10.0	13.6
Columbia River	20.7	28.1	3.4	40.3	22.3
Willamette Valley	20.8	52.7	20.5	21.9
Coos Bay	16.7	54.3	30.6	26.9
Total	16.0	32.3	7.6	20.7	19.7

¹Example—If among other species a given stand of timber in the Puget Sound district contains 20,000 ft. b.m. of western hemlock, 32.3 per cent of this amount, or 6,460 ft. b.m., will be left after logging as waste—assuming average conditions as indicated in the table.

²Practically all western hemlock in all districts except Coos Bay. In the Coos Bay district 15 per cent is western hemlock and 85 per cent is low-land white fir.

³Includes in the Puget Sound, Grays Harbor, Willapa Harbor and Columbia River districts one per cent or less of western white pine; in Willamette Valley district 51 per cent of sugar pine, western white pine and incense cedar; in the Coos Bay district 63 per cent of Port Orford cedar.

bucked", were the top remnants of the tree which were left. There were 33.7 of such tops with an average volume of 28.7 feet.

As mentioned earlier, there are many comparatively small trees mashed down or pulled over in the process of felling and yarding the larger trees. In nearly all cases these smaller trees are left on the ground. Table 7 shows that there are 28.4 of these per acre, with an average volume of 77.3 feet. Of these, 15.8 with an average volume of 107.1 feet were large enough to be included as sawlogs; 5 2/10 of them, with an average

volume of 137.4 feet of sound wood, were usually cut from the butt or first log of the tree to eliminate stump rot or other defects which would tend to lower the grade of the log. Most of the long-butting was done in Douglas fir and western hemlock.

There were many windfalls, trees that in years past had been blown over, but most of these were too defective for consideration. A few, however, contained sound wood in sufficient quantity to be of value. There were 1.1 of these sound windfalls containing an average of 506.3 feet. As will be seen, only a small per cent of these were classed as sawlogs but were thrown mostly into the fuelwood classification. All snags found lying on the ground that were sound enough to be included were listed as fuelwood. The amount of wood found in snags sound enough to be of any use was comparatively small, and was all classified as cordwood. Most of the loggers are taking out logs from windfalls and snags which contain merchantable material.

"Slabs" as a rule were most common in western red cedar but some came from other species. They were usually from hollow trees or logs which shattered into slabs when they were felled. There were 4.6 of these per acre with an average volume of 296.1 feet; none of them were classed as sawlogs.

"Logs—broken at both ends" (44.2 pieces per acre), "tops broken at large end" (33.7 pieces per acre), "trees pulled down" (28.4 pieces per acre) and "logs broken at one end" (14.5 pieces per acre) were most numerous, with a total of 120.8 pieces. In number of pieces these four classes of material equal more than three-fourths of all the slash found lying on the ground.

volume of 202.7 feet, were Class 1 logs. Most of these trees were western hemlock but on some sites many were Douglas fir, western red cedar, lowland white fir and some Sitka spruce. Occasionally trees were felled but not bucked and were left on the ground. These as a rule were comparatively small trees, having an average volume of 137.4 feet.

"Long butts", there being 1.9 per acre with an average



An aerial view of typical Coastal forest country in the Pacific Northwest.

Table 7. - Description of Material Left in the Woods After Logging in the Douglas Fir Region, with Number and Average Volume of Pieces, on Average Acre¹

Description of Pieces	Sawlogs ²					Not Suitable for Sawlogs										Total material average acre
	Class 1	Class 2	Class 3	Total		Pulpwood	Fuelwood	Shingle Bolts	Poles	Posts						
	AV. Vol. No. of per piece: pieces	AV. Vol. No. of per piece: pieces	AV. Vol. No. of per piece: pieces	AV. Vol. No. of per piece: pieces	AV. Vol. No. of per piece: pieces	AV. Vol. No. of per piece: pieces	AV. Vol. No. of per piece: pieces	AV. Vol. No. of per piece: pieces	AV. Vol. No. of per piece: pieces	AV. Vol. No. of per piece: pieces	AV. Vol. No. of per piece: pieces					
Log - Unbroken, sound, bucked at both ends	3.2 : 390.6 : 0.9 : 87.8 : 2.3 : 59.6 : 5.4 : 229.2					0.3 : 180.0 : 0.4 : 150.0							7.1 : 222.7			
Log - Culled for defect, bucked at both ends	0.2 : 750.0 : 0.1 : 70.0			0.3 : 510.0		0.4 : 150.0 : 0.4 : 570.0							1.1 : 400.9			
Log - Broken at both ends, not bucked	6.7 : 284.3 : 2.7 : 96.0 : 9.9 : 84.4 : 19.3 : 155.6					15.4 : 57.7 : 7.4 : 159.9 : 1.1 : 103.8							44.2 : 116.4			
Log - Broken at one end, one end bucked	3.9 : 417.7 : 1.0 : 110.0 : 2.6 : 145.1 : 7.5 : 274.8					3.3 : 127.8 : 3.3 : 276.2 : 0.2 : 90.0							14.5 : 239.5			
Log - Broken in middle, both ends bucked	0.1 : 850.0			0.1 : 850.0		0.3 : 320.0 : 0.2 : 750.0							0.6 : 551.6			
Top - Large end bucked	0.4 : 167.5 : 0.5 : 90.0 : 1.4 : 61.4 : 2.3 : 86.1					2.6 : 30.0 : 1.1 : 81.8 : 0.1 : 120.0							7.0 : 58.3			
Top - Broken at large end, not bucked	0.5 : 166.0 : 0.8 : 86.3 : 4.5 : 41.3 : 5.8 : 60.0					19.3 : 20.2 : 5.1 : 26.6 : 0.2 : 60.0 : 0.1 : 70.0 : 2.2 : 21.6							33.7 : 28.7			
Tree - Pulled down in logging and left	5.2 : 202.7 : 2.5 : 85.6 : 8.1 : 52.5 : 15.8 : 107.1					11.6 : 31.0 : 0.3 : 20.0							28.4 : 77.3			
Tree - Felled and left, not bucked	0.1 : 260.0			0.2 : 145.0									0.4 : 137.5			
Long Butt - Usually from butt log				0.3 : 130.0		1.4 : 132.9 : 0.2 : 180.0							1.9 : 137.4			
Wind Fall	0.2 : 800.0			0.3 : 556.7		0.2 : 240.0 : 0.6 : 570.0							1.1 : 506.3			
Snag - Felled													0.1 : 720.0			
Slab						0.4 : 450.0 : 1.1 : 861.8 : 1.9 : 97.9							4.6 : 296.1			
Total - for Average Acre	20.5 : 313.0 : 8.6 : 90.7 : 29.2 : 71.5 : 58.3 : 159.4					55.4 : 49.8 : 21.3 : 197.7 : 3.5 : 97.7 : 0.4 : 80.0 : 5.8 : 32.1 : 144.7 : 116.2										

¹Based on the seventy-seven acres taken on the first eleven of the twenty-four logging operations studied. Does not include waste material in stumps, standing trees or snags. Volumes are net, deductions having been made for defect.

²Study classification.

Table 8. - Comparison of Material Left in the Woods by Logger-Manufacturers, Independent Loggers and Independent Loggers Equipped to Manufacture Hemlock Lumber

CLASS OF OPERATION	No. of logging operations studied	Volume of Original Stand (Feet board measure per acre)					Log Transportation (Miles)		Material Left in the Woods After Logging (Feet board measure per acre)														
							Railroad Company- Owned	Other Carriers	Class 1 Sawlogs ²					Class 2 and 3 Sawlogs ²					Total	Based on original timber stand, Net amt			
		Western hemlock and Douglas- fir	Western red cedar and other ³	Western white-pine and other ³	Total	Western hemlock and Douglas- fir			Western red cedar and other ³	Western white-pine and other ³	Total	Western hemlock and Douglas- fir	Western red cedar and other ³	Western white-pine and other ³	Total	All other material and cordwood over							
Logger-manufacturer	12	78,053	19,389	2,316	5,553	105,313	11	12	17	40	3,545	2,307	46	145	6,041	1,328	1,324	14	101	2,647	10,322	19,010	18.1
	Per cent	74.1	18.4	2.2	5.3	100.0					3.5	2.2	0.4	1.4	5.8	1.3	1.3	0.4	1.0	2.6	9.8	18.1	
No. of trees		29.5	29.7	0.3	5.3	64.8																	
Vol. of av. tree		2,642	657	723	1,046	1,625																	
Independent logger	9	65,116	30,059	3,982	5,281	104,400	12	10	45	67	4,340	6,255	285	436	11,316	1,328	2,540	35	83	3,984	11,076	26,378	25.3
	Per cent	62.4	28.8	3.8	5.0	100.0					6.5	5.9	2.7	4.1	10.8	2.0	2.4	0.8	1.5	3.8	10.6	25.3	
No. of trees		23.1	47.5	0.8	4.1	75.5																	
Vol. of av. tree		2,819	632	4,978	1,278	1,382																	
Independent logger manufacturing hemlock	3	45,225	39,112	16,394	5,099	105,690		24	43	66	1,363	2,129	131	15	3,692	728	2,410	76	80	3,294	8,365	15,371	14.5
	Per cent	42.8	36.9	15.4	4.8	100.0					3.0	5.5	2.6	0.3	3.5	1.6	6.4	1.2	1.6	3.1	7.9	14.5	
No. of trees		9.8	50.6	3.1	2.6	66.1																	
Vol. of av. tree		4,521	775	5,269	1,941	1,602																	
Average	24	74,397	25,002	4,046	5,235	108,679	10.0	12.8	50.5	53.3	3,667	3,731	92	245	7,732	1,177	1,639	20	93	2,927	10,748	21,407	19.66
	Per cent	68.6	22.8	3.7	4.8	100.0					4.9	15.6	2.2	4.7	7.5	1.6	6.5	0.2	1.6	2.9	9.2	19.66	
No. of trees		25.0	35.0	1.0	4.0	65.0																	
Vol. of av. tree		2,984	716	4,046	1,309	1,679																	

¹Fractional board feet dropped.²Working plan classification and not commercial log grades.³Small amounts of Port Orford cedar, incense cedar, western white pine and sugar pine.⁴Per cent based on volume of individual species in original stand.⁵Per cent based on total volume in original stand.

Detailed explanation of this table is given by Mr. Hodgson in the succeeding installment entitled "Comparative Quantity of Logging Waste."

Comparative Quantity of Logging Waste By Classes of Operation

A discussion which considers topography, character of timber, transportation distance and similar factors.

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Editor's Note—This is the fifth installment of "Logging Waste in the Douglas Fir Region" by Mr. Hodgson, the complete report of which is being published in this journal. The sixth installment will appear in an early issue.

Comparative Quantity of Logging Waste by Classes of Operation

AS was anticipated, the survey shows that economic conditions, relative accessibility of markets, types of timber, character of ground, individual interest of particular employes, attitude of companies themselves, and other similar factors, play an important part in the matter of logging waste. In this section an attempt is made to measure the effect of some of these factors. The method used is by no means scientific; it was entirely out of the question to isolate factors or to contrast factors under otherwise strictly comparable conditions. Hence it is that the findings in this respect should not be considered as final.

Character of Logging Operation

It has been long held that the independent logger, who sells his logs in the open market is at a disadvantage in disposing of low-grade logs as compared to the operator who carries on logging and lumber manufacture as one business. Also, that the independent logger must leave certain classes of timber (such as relatively small hemlock logs), which the independent logger who has branched out to an extent into the manufacturing field can handle profitably. Moreover, the utilization on timber sale areas of the national forests of the region has been considered to be better than on operations cutting privately-owned timber, since the Government not only manages

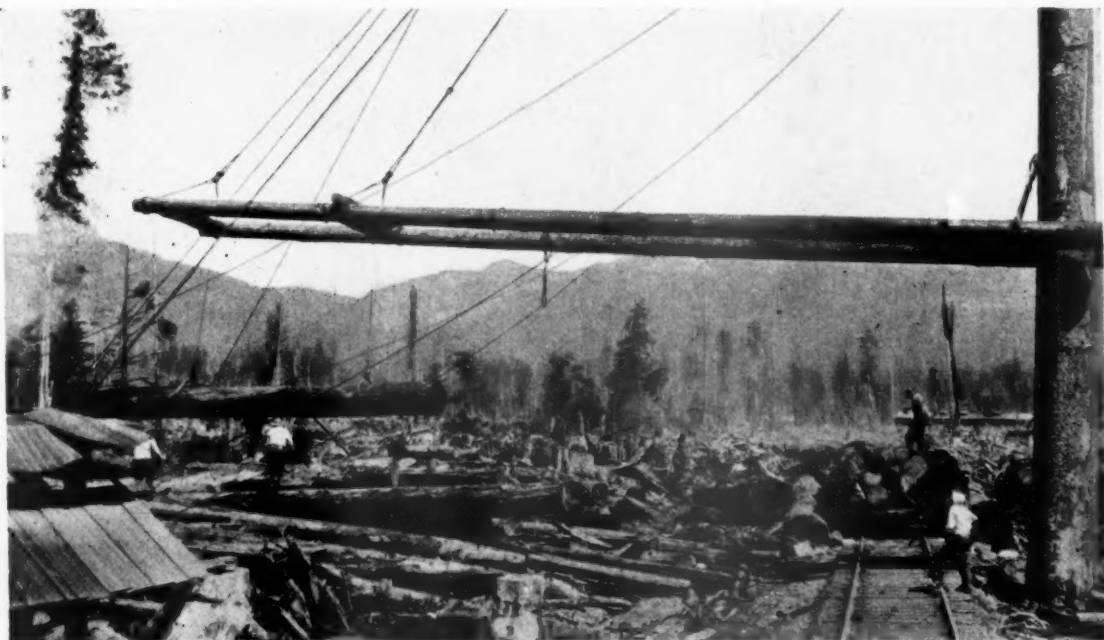
these timber lands on a sustained annual yield basis but in the drawing up and enforcement of timber-sale contracts aims to utilize the existing timber as closely as practicable.

Table 8 compares the average quantity of material per acre left in the woods respectively by the logger-manufacturer, the straight independent logger and the independent logger with facilities for manufacturing hemlock lumber or pulp. It shows that the latter class of operation is leaving the smallest quantity of material in the woods, or a total of 15,371 feet per acre; and the logger-manufacturer in an intermediate position, with 19,010 feet per acre. The same order holds when the comparative quantity of logging waste is based on a percentage of the original stand.

A similar condition is found when the comparison is based on the different classes of logging waste. The independent logger with hemlock lumber or pulp manufacturing facilities is shown to be leaving an average of 3,692 feet of Class 1 sawlogs per acre, the logger-manufacturer 6,041 feet, and the straight independent logger 11,318 feet. The difference is not so marked in the other classes of waste material, but the utilization by the straight independent logger is shown to be the poorest in all cases.

Factors other than those on which the comparison in Table 8 is based could be responsible for a part or even all of the dif-

Editor's note—Of the tables referred to in this installment, 8 appeared in the preceding installment; 11, 12, 13 and 14 appear in the installments that follow.



LOADING LOGS ON CARS

The photo shows the arrangement of the spar tree and boom with relation to the railroad (Grays Harbor region).



A STEEL-TOWERED YARDING AND LOADING UNIT

The logging industry in the Douglas fir region has been built on the basis of quantity production and low production costs.

ferences in the volume of logging waste. The table shows that conditions as to volume and character of original timber stand and length of railroad haul, are more comparable in the case of the logger-manufacturer and straight independent logger than with the independent logger with hemlock lumber or pulp manufacturing facilities. In the latter case, unfortunately, the comparison is based on an average of only three operations.

The utilization of logging waste for pulp awaits, in large measure, a combination of logging methods that will bring it to the pulp mill cheaply, and of a consuming demand involving a greater pulp tonnage and a wider variety of species than now employed.

Table 9 compares the average quantity of material per acre left in the woods by operators owning their own timber with that left by operators cutting national forest timber. It shows that the logger-manufacturer and independent logger operating in national forest timber are leaving an average of 8,990 feet and 16,376 feet per acre respectively, as compared to 20,471 feet and 25,899 feet respectively in the case of the independent logger and logger-manufacturer cutting privately-owned timber.

Similar results are shown when the comparison is based on the different classes of waste timber. The two logger-manufacturers cutting national forest timber left an average of 2,486 feet of Class 1 sawlogs per acre, as compared to an average of 6,653 feet for the 11 similar operators cutting privately-owned timber. The three independent loggers cutting national forest

timber left an average of 4,516 feet of Class 1 sawlogs per acre, as compared to 10,622 feet, the average amount left by the nine similar operators cutting their own stumpage.

However, the national forest timber was smaller and the stands lighter than the privately-owned timber. On the other hand, the national forest land was steeper and rougher than that privately-owned, and in the case of the independent loggers, the percentage of western hemlock in the stand of national forest timber was considerably higher.

Table 10 shows that when the logging waste is based upon the volume of original stand the average logger-manufacturer operating a tidewater sawmill is leaving 17.5 per cent as compared with the logger-manufacturer operating an inland sawmill who is leaving 19.8 per cent. On the other hand, 21,098 feet of waste per acre is being left by the former as against 14,833 feet, the amount of waste left by the latter.

The percentage of Class 1 sawlogs being left after logging is in favor of the operator logging to the inland mill, amounting to 4.8 per cent in volume of the original stand, as contrasted with 6.0 per cent, the amount of Class 1 logs being left by the operator logging to the tidewater mill. The actual volume of Class 1 logs being left is also in favor of the inland sawmill, amounting to 3,579 feet per acre as compared with 7,273 feet in the case of the tidewater sawmill.

It is necessary in connection with this comparison to note that the logger-manufacturers operating the inland sawmills were cutting both smaller timber and in a much lighter stand than the logger-manufacturers operating the tidewater mills, a condition in itself that could account for the difference in the quantity of material left in the woods by these two classes of operations.

Transportation Distance

The cost of transporting logs from woods to mill, whether by company-owned or common-carrier railroads, water or auto trucks, usually represents a considerable item of cost. Other influencing factors being equal, it would seem therefore, that the longer this transportation distance is the larger would be the quantity of logging waste left in the woods.

In Table 11 an attempt is made to compare the average quantity of material per acre left in the woods by operators hauling



STEEP TOPOGRAPHY AFTER LOGGING

Logging in steep country such as this is costly. It is also accompanied by much breakage and loss of good material, a large part of which is generally found at the bottom of the canyons.

less than 20 miles by rail with that left by operators hauling over 20 miles; the number of camps studied was so limited, when the effect of other influencing factors was taken into account, as to preclude a satisfactory analysis. The logger-manufacturer is shown as leaving a total of 15,644 feet of material per acre in the woods when hauling less than 20 miles by rail, as compared to 21,328 feet when hauling more than 20 miles. The total amount of material left by the independent logger is shown to be about the same under both hauling distances, with slightly better utilization in the case of those hauling the shorter distance.

Since the independent logger does not himself utilize his logs in the manufacture of lumber or other products but sells them in a competitive market, he is at a disadvantage in disposing of small or low-grade logs. It would therefore be expected that the effect of length of rail haul would be more marked in the case of logger-manufacturers than that of independent loggers.

Character of Timber

The character of timber possibly more than most other factors, influences the quantity of waste material left in the woods after logging. In medium-sized, even-aged stands, with the trees usually sound, the logging waste is usually low; breakage in falling and bucking under these conditions is comparatively low and the top logs are of relatively good quality. In large and rotten timber, which is likely to contain defective under-story trees, the logging waste is usually high; breakage in both the large and under-story timber, especially when considerable rot is present in the former, is uniformly high, and the top logs of the large trees and the majority of the logs of the suppressed trees are of relatively poor quality.

It was thought that Table 12 would serve, at least in a general way, to measure the effect of rot in timber in terms of quantity of material left after logging; the table, unfortunately, serves mostly to show that a satisfactory analysis cannot be made

by this method. The logger-manufacturers cutting comparatively sound timber are shown in the table as leaving in the woods a total of 16,342 feet of material per average acre, as compared to 27,140 feet in defective timber. On this basis of comparison, little or no difference in the quantity or character of the logging waste is shown in the case of the independent loggers.

Character of Topography and Ground

Topography and ground conditions also influence the quantity and character of the material left in the woods after logging; while they are different factors they are usually thought of as one. On steep topography or broken ground, or where the two are combined, much timber is necessarily broken not only in felling and bucking it into logs but in yarding the logs to the railroad. Also the cost of logging is comparatively high under such adverse conditions, with a consequent tendency for operators to leave certain low-grade material in the woods which would be logged under more favorable ground conditions, at least by the logger-manufacturer.

Table 13 contrasts quantity of material left in the woods as waste on comparatively level ground with that left on steep topography. It shows that the logger-manufacturers were leaving an average of 16,149 feet of material per acre, on comparatively level topography as compared to 20,177 feet on steep topography. Similarly, the independent loggers were leaving an average of 22,647 feet per acre on comparatively level topography, as compared to 28,499 feet on steep topography.

Table 14 compares the average quantity of material per acre left in the woods on comparatively smooth ground with that left on broken ground. It shows that the logger-manufacturer is leaving 15,950 feet per acre on smooth ground, as compared to 21,677 feet on broken ground. The independent logger is shown as leaving 21,743 feet of material per acre on smooth ground, as compared to 29,010 feet on broken ground.

LOGGING RAILROAD CONSTRUCTION IN THE DOUGLAS FIR REGION

Heavy and expensive construction,
steep grades and sharp curves add
to the cost of transporting logs.



PACIFIC PULP & PAPER INDUSTRY

Table 9. - Comparison of Material Left in the Woods by Operators Outting Privately-Owned Timber and Timber from National Forests

CLASS OF OPERATION	No. of logging operations	Volume of Original Stand (Feet board measure per acre)					Log Transportation (Miles)	Material Left in the Woods After Logging (Feet board measure per acre)										
		Western hemlock and Douglas-fir	Western cedar and Sitka spruce	Other species	Total	Per cent		Class 1 Sawlogs ²		Class 2 and 3 Sawlogs ²		Class 4 Douglas-fir and Sitka spruce		Class 5 Douglas-fir and Sitka spruce		Class 6 Douglas-fir and Sitka spruce		Based on original timber stand, per cent
Logger-manufacturer out- ting privately-owned timber	2	82,816	2,972	-	4,003	59,393	10.0	74.0	-	17.0	-	-	-	-	-	-	-	15.1
		69.0	4.3	-	5.7	100.0	-	-	-	-	-	-	-	-	-	-	-	
		46.7	11.1	-	5.7	63.5	-	-	-	-	-	-	-	-	-	-	-	
		1,121	231	-	702	926	-	-	-	-	-	-	-	-	-	-	-	
Logger-manufacturer out- ting privately-owned timber	11	76,384	126,640	3,754	5,330	111,035	10.0	12.9	126.7	49.6	-	-	-	-	-	-	-	16.3
		65.2	25.7	3.3	4.8	100.0	-	-	-	-	-	-	-	-	-	-	-	
		23.6	36.4	0.7	4.8	65.7	-	-	-	-	-	-	-	-	-	-	-	
		3,309	730	5,354	1,110	1,705	-	-	-	-	-	-	-	-	-	-	-	
Independent logger out- ting national forest timber	3	21,672	127,643	14,907	117,008	81,350	25.0	17.7	123.3	64.0	-	-	-	-	-	-	-	20.1
		25.5	34.3	16.5	20.9	100.0	-	-	-	-	-	-	-	-	-	-	-	
		12.4	44.9	2.6	10.4	75.5	-	-	-	-	-	-	-	-	-	-	-	
		1,609	570	5,324	1,455	1,077	-	-	-	-	-	-	-	-	-	-	-	
Independent logger out- ting privately-owned timber	9	73,974	30,030	7,440	4,102	115,744	3.9	14.4	41.0	60.1	-	-	-	-	-	-	-	22.3
		63.9	25.9	6.6	3.6	100.0	-	-	-	-	-	-	-	-	-	-	-	
		22.1	45.9	1.4	2.9	72.3	-	-	-	-	-	-	-	-	-	-	-	
		3,347	654	5,463	1,414	1,601	-	-	-	-	-	-	-	-	-	-	-	

¹ Fractional board feet dropped. ² Working plan classification and not commercial log grades. ³ The sample acres in the case of one of the companies studied represented both the factors compared.

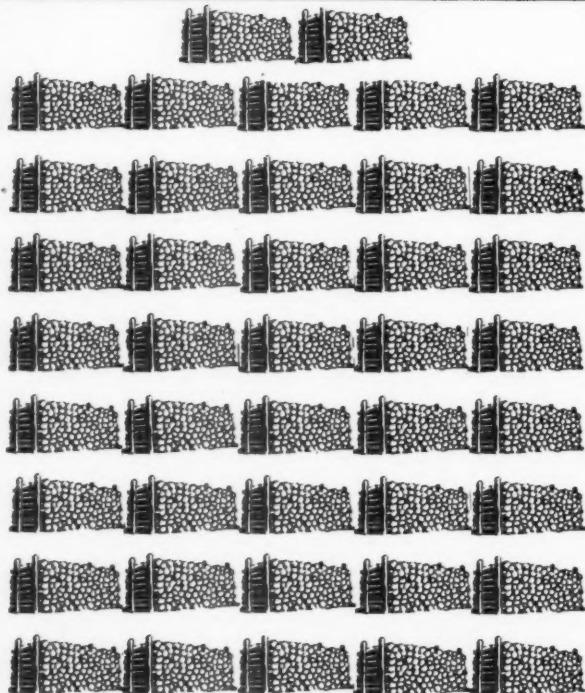
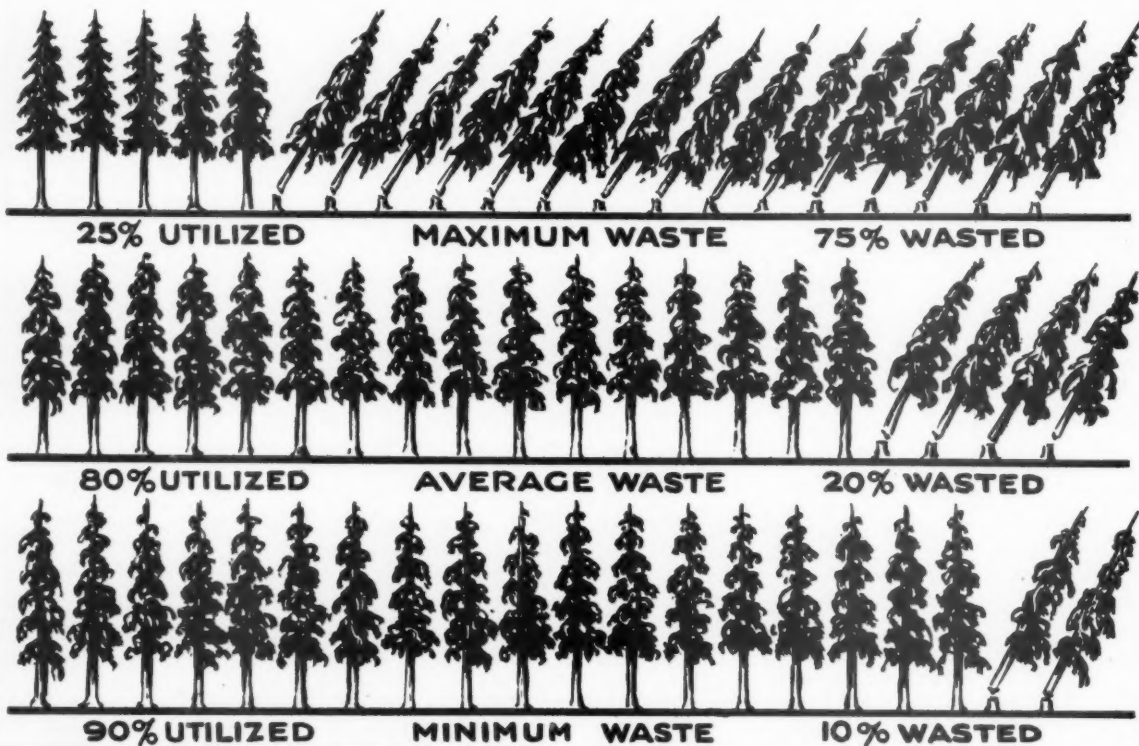
⁴ Small amounts of Port Orford cedar, incense cedar, western white pine and sugar pine. ⁵ Per cent based on volume of individual species in original stand. ⁶ Per cent based on total volume in original stand.

Table 10. - Comparison of Material Left in the Woods by Logger-Manufacturers Operating Inland Sawmills and Tidewater Sawmills

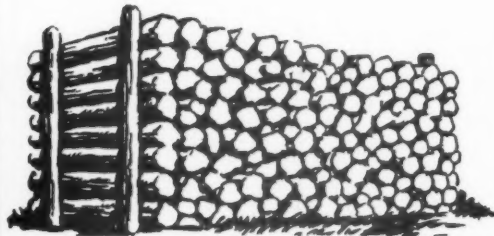
Class of operation	No. of logging operations studied	Volume of Original Stand (Feet board measure per acre)					Log Transportation (Miles)		Material Left in the Woods After Logging (Feet board measure per acre)									
		Western hemlock and cedar	Douglas-fir ¹	Sitka spruce ²	Other ³	Total	Carriers ⁴	Total	Class 1 Sawlogs ²					Class 2 and 3 Sawlogs ²				
									Western hemlock and cedar	Douglas-fir ¹	Sitka spruce ²	Other ³	Total	Western hemlock and cedar	Douglas-fir ¹	Sitka spruce ²	Other ³	Total
Logger-manufacturers operating inland sawmills	4	60,814	7,447	-	7,181	75,442	9.2	12.5	452	3,085	42	3,579	1,102	513	98	1,713	9,541	14,835
		80.6	2.2	-	9.5	100.0	-	-	6.0	4.6	0.6	1.6	6.8	1.5	2.3	12.5	19.8	19.8
		Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
Logger-manufacturers operating tidewater sawmills	8	86,672	25,350	3,476	4,739	120,237	11.6	25.4	69	3,776	3,234	194	7,275	1,240	1,730	21	10,712	21,098
		72.1	21.1	2.8	3.9	100.0	12.1	25.4	12.7	4.2	12.7	2.0	6.0	1.4	6.6	0.6	8.9	17.5
		Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
Average	12	76,053	19,369	2,518	5,553	105,513	11	17	46	3,545	2,507	143	6,041	1,208	1,324	14	10,322	19,010
		74.1	18.5	2.2	5.3	100.0	12	17	40	4.4	11.3	1.9	5.8	1.3	6.4	0.6	9.8	18.1
		Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
No. of trees	Vol. av. tree	29.5	29.7	0.3	5.3	64.8	-	-	-	-	-	-	-	-	-	-	-	-
		2,443	687	7,753	1,048	1,625	-	-	-	-	-	-	-	-	-	-	-	-
		Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent

¹Fractional board feet dropped. ²Working plan classification and not commercial log grades. ³Small amounts of Port Orford cedar, incense cedar, western white pine and sugar pine.⁴Per cent based on volume of individual species in original stand. ⁵Per cent based on total volume in original stand.

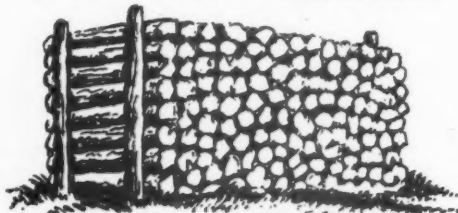
LOGGING WASTE IN THE DOUGLAS FIR REGION



42 CORDS
AVERAGE WOODS WASTE PER ACRE
IN DOUGLAS FIR REGION TAKING IN-
TO CONSIDERATION ONLY SOUND WOOD
OF CORDWOOD SIZE OR LARGER



6,448,000 CORDS
ANNUAL WOODS WASTE
IN DOUGLAS FIR REGION OF
WASHINGTON AND OREGON



5,484,517 CORDS
TOTAL ANNUAL 1928
CUT OF PULPWOOD IN THE
UNITED STATES

PREPARED BY
PACIFIC PULP & PAPER INDUSTRY
 FROM DATA COMPILED BY THE U.S. FOREST SERVICE

Some Possibilities of Reducing the Logging Waste

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POSSIBILITIES FOR REDUCING THE LOGGING WASTE

ALTHOUGH the primary purpose of the survey was to determine the quantity and character of the material left in the woods after logging in the Douglas fir region, brief reference to the possibilities for reducing such waste seems fitting. No attempt is made to point out new methods for solving the logging-waste problem, or in any sense to enter the field of speculation; the character of the study does not warrant such a discussion. Rather it is confined to new developments and noticeable trends in the forest industries of the region. The most promising phase of the whole logging waste problem is that considerable relief would be afforded if present progressive practice became general throughout the industry.

PREVENTATIVE MEASURES

Probably the most effective measures for cutting down the amount of logging waste are those which will tend to stop the practice of breaking trees into unmerchantable lengths.

Log Making

A large proportion of the logging waste is the direct result of breakage in log making. As suggested previously about 10 per cent of the timber on the average is badly broken in felling and bucking it into logs, with the breakage not infrequently running considerably higher. Obviously, if breakage could be reduced there would not be so much logging waste. Moreover, with breakage reduced to the minimum, the percentage of relatively small and short logs that are now utilized at little profit would be reduced considerably, a substantial gain in itself.

Just how much breakage is avoidable only a careful and complete study can bring out. The breakage could possibly be reduced one-third as a result of concerted and well-thought-out efforts on the part of all logging operators of the region. Much needless breakage is undoubtedly due to the carelessness of workmen. Faulty methods and practices and inadequate and unsatisfactory supervision also result in considerable avoidable breakage. And there are other sources of breakage or wood losses in log making that can be done away with, at least to a considerable extent.

Sometimes the reducing of breakage is sacrificed in order to favor another step in the logging operation; as, for example, timber is frequently thrown in a chosen direction, regardless of topographic or ground conditions, to help in the first step in transportation from the stump to the railroad. This simplifies the work of yarding and lowers breakage in that phase of logging but increases breakage at the time of felling. Also, in order to facilitate bucking the trees into logs, the timber is sometimes felled in such a way that breakage is increased above the normal amount.

While there may be nothing definite on which to base a judgment, it seems there is less breakage and other wood losses resulting from felling and bucking in some logging operations than in others, even where conditions as to timber, topography, ground, etc., are very similar. This in itself suggests that a reduction in breakage is practical under present economic conditions.

There are a few operators who still cling to the old day-wage system of paying fallers and buckers. They are willing to sacrifice the higher production which usually results from the "bushel" or contract system, for closer and better timber utiliza-

tion. The manager of one of the largest logging operations of the region claims that paying the fallers and buckers on a day-wage basis is the only way that excessive wood losses in felling and bucking can be avoided.

That the commonly-used bushel system, which provides for payment on the basis of output, tends to place a premium on carelessness and faulty methods is recognized by many loggers. They hope by more direct supervision or through modification of the system to eliminate its objectionable features. A few loggers, for example, are now paying their fallers on a basal area basis instead of the scale of the used portion of the tree. Penalties for unnecessary breakage have so far not only proven unsatisfactory but they have been hard to enforce.

Some companies employ "markers" who measure and mark the felled trees into suitable lengths for bucking into logs. In a few cases independent loggers employ qualified log graders for log markers as a means of getting the highest log grades from their timber. The more conscientious markers, in decid-



CUTTING A LOW STUMP

The tendency in many operations is, through methods of payment or effective supervision, to encourage the cutting of low stumps. Note that the fallers in this picture have abandoned the traditional "spring boards" and are standing on the ground.

ing whether a rotten log should be utilized will find out the extent of the rot by cutting notches into the log, occasionally as deep as 16 inches. While present-day markers have a beneficial effect upon poor felling practice, improper trimming lengths, sound material left in "long butts", "breaks" and "tops", etc., it would seem that with additional training, and given greater responsibility, they might well be able to make further reductions in logging waste.

As suggested, there seems to be a relation between the extent and effectiveness of the supervision given the felling and bucking department and the amount of breakage. General observations suggest that many operators are not giving enough or the proper kind of supervision to log making, with the result that

breakage is needlessly high. In contrast, other operators, with a system of supervision that provides checks and individual responsibility, have fostered an appreciation of timber values in their employees; these operators recognize that high production is a measure of efficiency but hold it secondary to the best possible utilization of the timber.

The care and skill exercised by the fallers and buckers unquestionably depends to a great extent on the rules of the company as these affect their efforts and earnings; also on how well the rules are enforced by the general manager, superintendent, foreman, bull buckers, log markers and wood scalers.

Yarding

In the case of relatively small trees, considerable timber is broken in yarding, particularly with long logs. In this connection it has been suggested that much of the breakage that



LOGGING WASTE AFTER LOGGING BUT BEFORE RE-LOGGING

Small logs and chunks, suitable for pulpwood, are usually left on the ground to rot or feed forest fires.

occurs when the logs are pulled one from the others could be prevented by better co-ordination of the felling and yarding departments, particularly as related to the felling direction.

Most loggers naturally aim to employ, organize and develop the personnel of their logging crews in such a way as to bring out all merchantable logs; in actual practice on many operations yarding crews become careless and frequently leave good logs in the woods. The occurrence of such cases are numerous enough and the timber volume sufficient as to warrant logging companies giving more attention to this matter. In some instances operators employ a check scaler to look over the logged-off area and measure up the logs that are left.

MODIFICATIONS IN LOGGING METHODS

Developments now under way indicate that before very long increased flexibility in yarding methods will result in the logging of smaller logs, and so-called re-logging or pre-logging methods will have reached a stage of perfection where it will pay to save much of the material which now goes to waste. It would not be surprising if this would not come about before there is a profitable market for the waste material as such.

Flexible Yarding Methods

To survive in the logging industry of the Douglas fir region it is necessary to get out logs cheaply; at least this is the way the loggers have viewed the situation for years. The efficiency of the operating head has been measured almost entirely in terms of quantity production and low cost per thousand feet of output. This, together with the large trees found in most stands, sets a premium on the development of huge, high-speed engines which are poorly adapted for handling relatively small timber. In addition, there possibly has been too much standardization of methods.

At present lighter and more mobile yarding machines are being developed; the logger now has a variety to select from.

These new machines, usually driven with gasoline, are designed for yarding comparatively small timber or timber of mixed sizes. Their output is less but under certain conditions they produce logs more cheaply than the large yarders or skidders ordinarily used. The lighter machines have a low initial cost and require relatively few men to operate.

A few operators strive for the maximum of flexibility in yarding methods by employing different sizes and types of machinery and by fitting yarding methods to the ground and timber conditions. Through careful study and planning they aim to use the most effective method for a particular site. This sometimes makes possible the profitable logging of the smaller trees. One company is using five distinct methods in yarding its timber.

Re-logging Methods

Pre-logging or re-logging, either of which is a two-step method of yarding in contrast to the commonly-used one-step method, holds much promise for reducing logging waste. Going over the ground twice, each time using the most economical equipment and methods, represents a departure only in the case of sawlogs; the pre-logging of poles and piling or both the pre-logging and re-logging of shingle bolts has been practiced for years.

For the past few years a pulp and paper company of the region has been developing a method for logging economically relatively small logs and broken chunks. It first tried re-logging with more or less standard equipment and with only fair success. Then it investigated the possibilities of pre-logging, coming to the conclusion that re-logging, at least for their type of ground and timber, was the better of the two methods. The re-logging system finally adopted by the company made use of a light, mobile, gasoline-driven yarder mounted on a caterpillar. At the time the investigation was made it apparently was giving very satisfactory results.

In a period of four months the company salvaged 4,000,000 board feet of small logs and chunks from the slash of recently cut-over land. The logs averaged about 150 board feet, with some as short as 12 feet and others only 4 inches in diameter. To determine the quantity and character of logging waste before and after re-logging, measurements were made on sample plots located under comparable conditions. In stands of almost pure western hemlock and white fir, averaging 79 trees and about 80,000 board feet per acre, the major or initial logging operation left about 12,000 board feet of waste per acre, or



APPROXIMATELY THE SAME AREA AS ABOVE AFTER RE-LOGGING

About 10,000 feet b.m. of small logs per acre were salvaged by a pulp and paper operator. Re-logging promises to be a means of utilizing much material now wasted.

slightly more than 15 per cent of the original stand. After re-logging, 2,449 feet, or only slightly more than 3 per cent of the original stand of timber, was found on the ground unutilized. The re-logging operation was found to have salvaged 9,551 board feet per acre, or an amount equal to 12 per cent of the timber stand.

Table 11. - Comparison of Material Left in the Woods by Operators Hauling Logs by Rail Over Short and Long Distances

Class of operation	No. of logging operations included	Volume of Original Stand (Feet board measure per acre)										Material Left in the Woods After Logging (Feet board measure per acre)									
		Western					Douglas-fir					Class 1 Sawlogs ²					Class 2 and 3 Sawlogs ²				
		Western hemlock	Western red cedar	and other	Douglas-fir	Total	Western hemlock	Western red cedar	and other	Douglas-fir	Total	Western hemlock	Western red cedar	and other	Douglas-fir	Total	Western hemlock	Western red cedar	and other	Douglas-fir	Total
Logger-manufacturers hauling logs 20 miles or more by rail	6	63,177	130,360	3,180	5,636	102,543	63,177	130,360	3,180	5,636	102,543	1,766	2,751	23	54	4,594	769	1,561	13	61	2,404
Per cent		61.4	29.6	3.1	5.7	100.0	61.4	29.6	3.1	5.7	100.0	2.4	2.6	0.0	0.2	4.5	1.2	1.5	0.0	1.0	2.3
No. of trees		28.3	40.9	0.6	3.7	73.5	28.3	40.9	0.6	3.7	73.5										
Vol. av. tree		2,232	742	5,300	1,577	1,393	2,232	742	5,300	1,577	1,393										
Logger-manufacturers hauling logs less than 20 miles by rail	7	80,974	116,497	3,141	4,517	105,129	18,7	13.7	121.4	53.8	4,761	2,195	72	199	7,227	1,411	1,296	22	121	2,680	11,261
Per cent		77.0	15.7	3.0	4.3	100.0	18.7	13.7	121.4	53.8	4,761	2,195	72	199	7,227	1,411	1,296	22	121	2,680	11,261
No. of trees		26.5	25.4	0.5	5.9	59.3	26.5	25.4	0.5	5.9	59.3										
Vol. av. tree		3,055	680	6,282	765	1,803	3,055	680	6,282	765	1,803										
Independent loggers hauling logs less than 20 miles by rail	6	71,552	126,755	5,473	3,529	107,309	5,355	3,950	317	124	9,706	1,529	2,519	48	34	4,125	10,067	25,898	22.2	9.8	22.2
Per cent		66.6	25.0	5.1	3.2	100.0	5.3	3.9	0.3	1.2	9.7	1.5	2.5	0.2	0.1	4.1	10.1	25.9	2.2	9.8	22.2
No. of trees		28.6	82.3	1.0	2.7	84.6	28.6	82.3	1.0	2.7	84.6										
Vol. av. tree		2,802	530	5,473	1,307	1,268	2,802	530	5,473	1,307	1,268										
Independent loggers hauling logs 20 miles or more by rail	5	56,472	132,484	7,765	8,261	105,202	1,946	7,022	193	649	9,810	993	2,485	40	157	3,475	11,533	25,018	23.6	11.0	23.6
Per cent		53.9	30.2	7.4	7.8	100.0	1.9	7.0	0.2	0.6	9.8	2.4	2.5	0.0	1.6	3.5	11.0	25.0	2.3	11.0	23.6
No. of trees		12.9	29.6	1.4	5.7	59.8	12.9	29.6	1.4	5.7	59.8										
Vol. av. tree		4,392	816	5,561	1,430	1,760	4,392	816	5,561	1,430	1,760										
Average	24	74,597	125,002	4,046	5,225	108,879	3,667	3,721	92	245	7,732	1,177	1,639	20	95	2,927	10,748	21,407	19.66	9.9	19.66
Per cent		69.5	22.2	3.7	4.6	100.0	4.0	3.7	0.2	0.6	7.7	1.6	1.6	0.2	0.5	2.7	10.7	21.4	1.9	9.9	19.66
No. of trees		25.0	35.0	1.0	4.0	65.0	25.0	35.0	1.0	4.0	65.0										
Vol. av. tree		2,964	714	4,046	1,309		2,964	714	4,046	1,309											

¹ Practical board feet decayed. ² Working plan classification and not commercial log grades. ³ Small amounts of Port Orford cedar, incense cedar, western white pine and sugar pine.

⁴ Per cent based on volume of individual species in original stand. ⁵ Per cent based on total volume in original stand.

Detailed explanation of this table was given by Mr. Hodgson in the installment entitled "Comparative Quantity of Logging Waste."

Table 12. - Comparison of Material Left in the Woods by Operators Logging Comparatively Sound Timber and Defective or Rotten Timber

Class of Operation	No. of logging operations	Volume of Original Stand (Feet board measure per acre)					Log Transportation (Miles)		Material Left in the Woods After Logging (Feet board measure per acre)										
									Class 1 Sawlogs ²		Class 2 and 3 Sawlogs ²		All other material		Based on original timber stand, per cent				
		Western hemlock and white fir	Western red cedar and Sitka spruce	Other	Total	Common	Relroad	Western hemlock and white fir	Western red cedar and Sitka spruce	Other	Total	Western hemlock and white fir	Western red cedar and Sitka spruce	Other		Total			
Logger-manufacturers cutting sound timber ⁵	12	80,475	26,046	3,420	5,963	113,906	7.2	11.8	2,756	2,461	27	37	5,261	1,102	1,539	8	35	2,684	14.3
Per cent		70.7	22.9	3.0	5.4	100.0			2.4	2.1	0.2	0.3	4.6	1.0	1.3	0.7	2.9	2.3	16.2
No. of trees		29.0	34.6	0.5	3.6	67.7													
Vol. av. tree		2,775	763	6,940	1,100	1,682													
Logger-manufacturers cutting defective timber ⁶	7	57,470	19,161	4,547	4,049	85,027	13.0	15.0	4,932	3,099	156	225	9,212	939	1,620	69	112	2,740	31.9
Per cent		57.5	22.4	5.0	5.0	100.0			4.6	3.6	0.2	0.3	10.8	1.0	1.9	0.8	2.7	3.2	31.9
No. of trees		13.7	39.4	1.2	3.6	57.9													
Vol. av. tree		4,195	486	3,622	1,125	1,470													
Independent loggers cutting sound timber ⁵	10	59,954	29,514	5,974	4,266	109,830	3.5	14.2	3,861	5,566	213	257	9,907	1,322	2,497	39	44	3,902	22.1
Per cent		53.7	26.9	5.4	4.0	100.0			3.4	5.0	0.2	0.3	9.0	1.2	4.4	0.6	1.0	3.6	22.1
No. of trees		23.3	46.9	1.5	3.2	74.7													
Vol. av. tree		3,002	629	4,595	1,371	1,470													
Independent loggers cutting defective timber ⁷	3	28,493	121,103	42,089	7,662	99,347	28.0	15.0	2,862	2,733	2,378	517	8,510	1,035	2,070	267	222	3,594	24.8
Per cent		28.7	121.2	42.6	7.7	100.0			10.1	12.9	8.6	5.6	8.5	1.0	2.2	0.6	2.2	3.7	24.8
No. of trees		6.2	30.3	4.3	4.7	45.5													
Vol. av. tree		4,595	696	9,713	1,630	2,183													

¹ Fractional board feet dropped. ² Working plan classification and not commercial log grades. ³ The sample acres in the case of several of the companies studied represented both of the factors compared.

⁴ Small amounts of Port Orford cedar, incense cedar, western white pine and sugar pine. ⁵ Not 7 per cent. ⁶ Not 22 per cent. ⁷ Not 15 per cent. ⁸ Per cent based on volume of individual species in original stand.

⁹ Per cent based on total volume in original stand.

Detailed explanation of this table was given by Mr. Hodgson in the installment entitled "Comparative Quantity of Logging Waste."

Diversification of Markets

An Analysis of Forest Products With a View of Reducing the Logging Wastes

Waste, wherever you find it, is a liability, rather than an asset.

By ALLEN H. HODGSON

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Editor's Note—This is the seventh installment of "Logging Waste in the Douglas Fir Region" by Mr. Hodgson, the complete report of which is being published in this journal. The eighth installment will appear in an early issue.

DIVERSIFICATION OF MARKETS

IN this day of applied science, it is reasonable to believe that sooner or later not only profitable uses but economical methods of logging and manufacture will be found for at least a considerable proportion of the logging waste of the region. However, on the basis of present economic conditions and existing knowledge, one cannot see more than a gradual reduction in the waste, as a result of an increased demand for small and low-grade logs for mechanical and especially chemical products.

Mechanical Uses

The bulk of the timber cut and utilized in the region enters into so-called mechanical uses, including lumber, structural timbers, ties, lath, shingles, box shooks and similar forms; also such round forms as poles and piling. In this general use considerable logging waste could be utilized if the market demand, particularly for low-grade lumber, cut-up stock, shingles, lath and box shooks, increased in such degree as to raise the selling price. Something of the same effect would result from cheaper logging and manufacturing methods. It is because of this set-up that the statement is often made that the logging and mill waste problem of the region is largely the result of economic conditions.

Lumber

Since the bulk of the timber cut in the Douglas fir region is made into lumber, the market for and value of this product naturally exerts the greatest influence upon the character of timber utilization in the woods. While sawlogs are utilized for veneer, cooperage, shingles, paper pulp, and similar products, it is their use for lumber that in large measure fixes their value and determines utilization standards. Therefore, anything that can be done to extend the lumber markets of the region (particularly the lower grades of common lumber) and to stabilize lumber prices will tend to reduce logging waste; this is fundamental and is so recognized by all students of the problem. Right now the West Coast Lumbermen's Association is making a special effort to broaden the markets for forest products of the region and to stabilize production and prices.

Of necessity, the industry is now producing more low-grade common lumber from present commercial sawlogs than can be marketed profitably. Obviously, better means for disposing of this class of lumber must be found before there will be a demand by manufacturers for the "rough" logs of questionable merchantability now left in the woods. It has been suggested that a large amount of this low-grade lumber is better suited for "cutting" stock in factory and industrial uses than for general construction purposes; in fact, the industry in its exploration of this general field has already been able to improve its position somewhat with regard to this class of lumber.

Except that plant facilities in general are not well suited for sawing small logs at minimum cost or for specialized manufacture by species, the industry as now organized and equipped—marginal production eliminated from the picture—produces a multiplicity of lumber forms with reasonable efficiency. From Douglas fir, Sitka spruce, western red cedar, western hemlock, Port Orford cedar, and the true firs, it doubtless produces a greater variety of softwood sawmill and planing mill products than any other forest region. While the early operations consisted of small, simple sawmills, producing rough-green lumber,



SCALING AND GRADING LOGS

Log scaling and grading bureaus, an outgrowth of log markets, act as referees between seller and buyer to determine the grade and contents of logs. The logging of timber by independent loggers tends to encourage the leaving of rough and partially-defective logs in the woods.

those of the present are for the most part large, substantial and well-equipped plants, in many cases with the maximum of labor-saving machinery. Such plants permit of diversified production, including the manufacture of so-called by-products when market conditions warrant. In addition to a planing mill they may include a sash and door factory, a veneer factory, a cooperage plant, a box factory, a shingle and lath mill, and facilities for transforming mill waste into hogged fuel or paper pulp chips.

In the designing of new lumber manufacturing plants, there is at present a tendency to depart from the old general-purpose type of sawmill which was built to saw logs of different sizes and grades and of mixed species, and to provide facilities that permit of specialized manufacture, with consequent economies and otherwise better utilization of the timber. The simple but modern hemlock mill designed to manufacture small logs at minimum cost has seemingly demonstrated that it has a place in the industry; it will doubtless salvage much of the logging waste. And the usefulness of the special type of mill is by no means confined to western hemlock.



"HOGGED" FUEL CARS

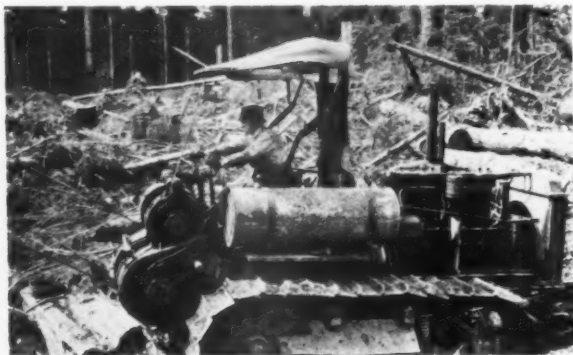
A large proportion of the mill waste resulting in Douglas fir lumber manufacturing is now ground up, or "hogged" and used for heating and power purposes.

There are also a few mills that specialize on "rejects" or "culls" which more often are good-sized logs containing so much rot as to drop them from any of the commercial log grades. One independent logger, for example, has installed a circular sawmill of 15,000-foot capacity in the production of bridge timbers and cross ties utilizing the culled logs resulting from his own logging camps. The output not used in his own logging railroads is sold to neighboring companies. Mill waste is sold as fuel to the employees and nearby settlers or used as puncheon in road construction over boggy land. From material that otherwise would be classed as logging waste, this company was making money; it was said that over a period of seven months a net profit of \$13,307 was shown.

Shingles

Primarily because a large proportion of the western red cedar cut in the region goes into shingles, the utilization of this species in the woods has been exceptionally good for a long time and for this reason it is unfortunate that the shingle cut of the region is now considerably smaller than it was a decade or so ago; the industry at present is no more than holding its own. A stabilized price for shingles, with even slightly increased production, would have the effect of improving the woods utilization of western red cedar.

Not only is western red cedar a highly suitable wood in shin-



A CATERPILLAR TRACTOR WITH YARDING DRUMS

A simple, non-expensive, and mobile yarding engine used by a pulp and paper company in salvaging logging waste.

gle manufacture but the manufacturing process is such that relatively small and defective material can be used economically. The shingle material is obtained in the form of logs and bolts, more often by purchase in the log markets. Relatively small logs or bolts are used by the "straight" shingle mills, while large logs are generally used by the "combination" mills, or those making both lumber and shingles.

The production of shingle bolts is a small industry in itself. They are generally made in the woods by men especially employed for the work, and not infrequently by ranchers in land clearing. Living and dead, standing and down cedar is bucked into sections usually 52 inches long. These are split into bolts of convenient size for handling.

Bolt cutting may precede or follow logging. In the latter the bolts are made from suitable pieces of cedar left after logging, so the utilization is very close. Many bolts are delivered from the woods to the mill by river driving; streams too small or too rough for log driving are often drivable for bolts.

Boxes and Crates

The box industry of the region, which at present is seemingly well developed, provides an outlet for large and increasing amounts of low-grade logs, particularly in the case of western hemlock and white fir. Without the market supplied by local box factories, production of lumber in the region doubtless would not only be curtailed somewhat, but much low-grade material now utilized would be left in the woods as waste.

Low-grade Sitka spruce, western hemlock and white fir lumber containing more or less knots and other defects but otherwise excellent material, furnish the bulk of material used in the region for boxes; this, of course, necessitates the cutting out of defects not permissible in the boxes. While some of the companies of the region, both large and small, report the use of "mill-run" lumber, more often the poorer grades of common lumber are used.

All signs point to a gradual growth in the box industry of the region. It has been estimated that the amount of lumber used annually in the United States in the manufacture of shipping containers is between five and six billion board feet, or about one-sixth of the total lumber cut. Although there is still a large quantity of low-grade timber in the East and South, it may be predicted with reasonable assurance that the demand for boxes of western manufacture will increase.

Poles and Piling

It seems that the demand for piling and pole material of the region, particularly the latter, might be expanded to a point where small trees now left in the woods as waste could profitably be utilized for such products; the waste survey shows that a considerable quantity of relatively small Douglas fir, western hemlock and western red cedar trees, suitable for poles or piling, are not utilized. A steadily increasing consumption of poles by the large telephone and power companies emphasizes the need of utilizing for poles every species of wood which is available in commercial quantities. The gradual depletion of accessible bodies of western red cedar pole material is resulting in a demand for pole timber of other species which will answer the requirements.

The extensive use of western red cedar as a pole timber has been mainly because of its durability or decay-resisting qualities when in contact with the soil. Among the other woods of the region being considered as a future supply is western hemlock which has many desirable properties for pole use; readily available in commercial quantities, its strength compels the serious consideration of pole users. Equally or more promising, and even more available, is Douglas fir; its great strength makes it a very desirable species for pole use. Given a preservative treatment, both of these species will yield a product possessing the necessary requirements for good pole timber.

Douglas fir has long been a standard piling material. It has no important competitor in the western part of the United States, or even in the eastern part when exceptionally long piling is required.

Fuel

While a considerable quantity of the logging waste of the region may ultimately be used for fuel, comparatively little of it as such is so utilized at present. The bulk of the fuel wood consumed in the region, amounting to millions of cords, consists of mill waste in the form of slabs, edgings and hogged wood, or split wood from comparatively accessible timbered areas.

The importance of fuel wood to the region in general, also its possibilities as a means for utilizing logging waste, may not be fully appreciated. The wide distribution of timber in the region and the fact that it is so located as to save transportation, has tended to increase its comparative value for fuel. It is used in homes, schools, churches, and even in industrial plants. Wood waste, unfortunately, occurs at every stage of manufacture of wood products, from logging through the milling process and in the special processes necessary to shape the article into its final form; a wide use of wood fuel in the region affords a market for much of this material.

CHEMICAL USES

A number of agencies can help in the reduction of the logging waste in the Douglas fir region. While logging waste un-

questionably is a problem that the timberman, the lumberman and the logger primarily should wrestle with, the economist, the chemist, the mechanical engineer, the capitalist and the public undoubtedly can contribute much to its solution. And many think that the chemist ultimately will make the biggest contribution. His part is not only to make all the chemical properties of wood available, but to indicate how they may be used with profit.

Except for the production of a small quantity of charcoal and the utilization of a negligible amount of hemlock bark in local tanneries, chemical utilization of wood in the region is limited to the pulp and paper industry.

Pulp and Paper

The pulp and paper industry possibly offers the best market now in sight for much of the logging waste of the region. However, it is doubtful if the industry will start to draw to a marked extent on this potential pulpwood supply until the price of sawlogs in the open market has advanced to such point as to make the utilization of the logging waste economical, and then only after all available and suitable supplies of mill waste have been exhausted.

While the pulp and paper industry of the Douglas fir region is fairly old and well established, further and marked expansion is predicted for the near future. Furthermore, it may well be that research will show how Douglas fir can be used satisfactorily in the production of both kraft and white papers.

Prediction of increased production of paper pulp in the Douglas fir region is largely dependent on the large supply of suitable pulpwood and available water of the region, the depleted supplies of pulpwood in the East, and the exceedingly rapid growth and present volume of pulp and paper imports into the United States. For the country to produce at home the pulp and paper now imported and to become independent of pulpwood imports, it seems absolutely essential that it should turn to the Douglas fir region to a much greater extent for its pulp and paper supplies.

The species used in the region for pulp manufacture include Sitka spruce for mechanical pulp, western hemlock for mechanical, sulphite and sulphate, some true firs for mechanical and sulphite, some Douglas fir for soda and sulphate and black cottonwood for soda. Satisfactory pulps and papers of wide variety, including the finest, are made from them.

The pulp wood is available to pulp mills in various forms on a more or less competitive basis, including sawlogs, cordwood, mill and factory trimmings, pulp chips converted from sawmill and factory waste, and logging waste. Which of these classes of material will prove the more satisfactory remains to be seen. Broadly speaking it is apparent that utilization of these classes of material for paper does not constitute competition to the lumber producer but rather co-ordination of effort in the fuller utilization of wood.

Sawlogs still constitute the bulk of the pulpwood consumed but mill waste has been increasingly used in the last few years. Nearly all of the pulp plants are using some mill waste; in some cases it constitutes the entire wood supply; in fact, spruce and hemlock mill waste adjacent to deep water is almost completely utilized for pulp. In at least one case No. 3 Common western hemlock lumber is used for sulphite pulp. The supply of logging waste has been drawn on to slight extent in the case of Sitka spruce, and as has been pointed out one pulp and paper company is attempting to salvage low-grade logs and chunks of western hemlock and true fir.

The utilization of logging waste for pulp awaits, in large measure, a combination of logging methods that will bring it to the pulp mill cheaply, and of a consuming demand involving a greater pulp tonnage and a wider variety of species than now employed.

In any endeavor to increase the utility of the species of the region for pulp, Douglas fir demands high priority. Its use is sorely needed in strong, light-colored papers which are now heavily imported or derived largely through sulphite pulp from eastern spruce. And this objective may not be difficult to reach; many species other than the spruces, hemlock and true firs have produced satisfactory strong, light-colored papers, including southern pines, larch and chestnut.

Wood Distillation

The wood distillation industry, in some form or other promises ultimately to provide a means for utilizing much of the logging waste of the Douglas fir region. Except for the production of a small amount of charcoal, there is no wood distillation in the region at present. Unfortunately, commercial attempts to obtain valuable by-products from Douglas fir by this means have failed.



SORTING LOGS INTO RAFTS FOR DELIVERY TO THE MILLS

Rafts containing logs of given species and grades are towed for 100 miles or more to sawmills and wood-working plants whose specialties require logs of certain types. The logger in this way is able to reach a diversified market.

At present the "destructive" softwood distillation industry in the South, where only the more resinous portions of southern pine are used, is not in a very thriving condition. The industry there is barely successful even though favorably situated and under careful management. In the light of this, an industry in the Pacific Northwest using Douglas fir logging waste of similar resinous content might have serious difficulty in making it pay.

The yields from experiments with unselected Douglas fir are considerably lower than those obtained in commercial practice in the South. While the yields of alcohol and acetate of lime from Douglas fir are practically the same as from southern pine, they are so small in both cases as to make their recovery hardly profitable at present. The yield of turpentine from Douglas fir is practically negligible when compared with selected southern pine. The combined yields of turpentine and other oils from Douglas fir are less than one-fourth of that from southern pine.

In the destructive distillation of Douglas fir the value of the charcoal obtained will be higher than that of all other products combined. Good charcoal, however, can be produced in kilns, but this allows the by-products to go to waste. The simplicity of a charcoal kiln and the large units which may be employed, make its first cost and subsequent operating expense much less than in a complete distilling and refining plant; and unless the value of the additional products obtained with an elaborate plant is greater than the additional cost of operation, obviously there is no financial advantage in such construction. Wood distillation processes, however, are going through many changes with both the mechanical and chemical engineer at work and no one knows what the immediate future may bring.

Tannin Extract

The development of a tannin extract industry in the region would at least, indirectly, contribute to a reduction of the logging waste. At present the bark is not used as a tanning material but is actually a hindrance in the utilization of logs for lumber, veneer, paper pulp and other products.

The bark of western hemlock is richer in tannin than that of eastern hemlock, although its bark is thinner than the eastern variety. The bark of Sitka spruce also has a high tannin content, as shown by investigations.

Despite the large supply of western hemlock bark, the cost of harvesting it has not only been high but the methods used interfered with the sawlog operation. Improved methods for making available the bark of western hemlock have been proposed and considerable investigative work has been done by the University of Washington and the Forest Products Laboratory of the Forest Service.

PACIFIC PULP & PAPER INDUSTRY

Table 15. - Comparison of Material Left in the Woods by Operators Logging in Comparatively Level and Steep Topography

Class of Operation	No. of Logging Operations	Volume of Original Stand (Feet board measure per acre)					Log Transportation (Miles)		Material Left in the Woods After Logging (Feet board measure per acre)														
		Class 1 Sawlogs ²					Class 2 and 3 Sawlogs ²		Class 2 and 3 Sawlogs ²														
		Western hemlock and Douglas fir	Western red cedar and other	Western white pine and other	Total	Per cent	Common	Overhead line	Western hemlock and Douglas fir	Western red cedar and other	Western white pine and other	Total	Per cent	Western hemlock and Douglas fir	Western red cedar and other	Western white pine and other	Total	Per cent	Based on original timber stand, per cent				
Logger-manufacturer logging in level topography	10	76,846	125,108	6,193	4,295	112,520	6.7	12.2	166.01	44.9	2,806	2,432	75	44	5,057	823	1,438	30	54	2,345	8,747	16,149	14.3
		59.3	99.3	5.5	3.8	100.0					2.5	2.5	0.5	0.5	4.5	1.5	5.5	0.5	1.5	2.5	7.5	14.3	
No. of trees		29.6	33.6	10.3	4.2	66.4																	
Vol. av. tree		2,525	750	601	1,023	1,645																	
Logger-manufacturer logging in steep topography	9	66,356	22,908	113	4,645	94,224	10.4	10.3	120.4	41.1	4,139	3,133	-	196	7,470	1,396	1,609	3	121	3,129	9,578	20,177	21.4
		70.4	24.3	0.1	5.2	100.0					6.5	13.7		4.0	7.9	2.1	7.0	2.5	2.5	3.3	10.2	21.4	
No. of trees		27.3	34.9	0.1	5.0	67.3																	
Vol. av. tree		2,430	657	1,014	969	1,400																	
Independent logger logging in level topography	9	62,164	30,549	11,333	5,467	109,513	12.2	14.1	131.1	57.4	1,987	5,669	450	378	8,464	810	2,661	86	49	3,606	10,557	22,647	20.6
		56.9	27.2	10.3	4.9	100.0					3.2	18.8	4.0	6.9	7.6	1.3	8.7	0.7	0.7	3.5	9.6	20.6	
No. of trees		18.6	47.9	2.1	3.4	72.0																	
Vol. av. tree		3,342	636	5,397	1,608	1,500																	
Independent logger logging in steep topography	6	70,141	120,762	1,128	7,304	199,235	12.5	14.7	166.51	65.7	6,120	4,852	136	366	11,493	1,680	2,446	-	162	4,288	12,718	28,499	26.1
		64.2	28.1	1.2	6.5	100.0					8.7	13.7	12.0	6.2	10.6	2.4	7.9		2.2	3.5	11.2	26.1	
No. of trees		17.7	41.4	0.3	4.6	64.2																	
Vol. av. tree		3,922	1,095	940	1,106	1,701																	

¹ Fractional board feet dropped.² Working plan classification and not commercial log grades.³ The sample acres in the case of several of the companies studied represented both the factors compared.⁴ Small amounts of Port Orford cedar, incense cedar, western white pine and sugar pine.⁵ Per cent based on volume of individual species in original stand.⁶ Per cent based on total volume in original stand.

Detailed explanation of this table was given by Mr. Hodgson in the installment entitled "Comparative Quantity of Logging Waste."

Integration of Wood Using Industries

In Which the Author Sums Up the Logging Waste Survey and Points to a Trend in Manufacture That Bids to Effect a Closer Utilization of the Forests

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Editor's Note—This is the eighth and last installment of "Logging Waste in the Douglas Fir Region" by Mr. Hodgson, the complete report of which has been published in this journal.

INTEGRATION OF WOOD-USING INDUSTRIES

AMONG the practicable means for reducing wood losses in both woods and mill is the further tying together of timber growing, logging and manufacture. This should be under one management, where feasible, but at least with the three agencies so coordinated as to function in effect as a single, well balanced, give-and-take undertaking. This involves the technical production of a variety of mechanical and chemical products, including lumber, shingles and similar forms, of re-manufactured products from lumber, of pulp and paper or such converted products as fibre containers and insulating board, of commodities perhaps chemical in nature, or of fuel for heating and power, all in separate units of one plant or closely-knit organization. Where the use requirements demand lumber, supply lumber; where they demand wall board, supply that; where wooden boxes and fibre containers, supply one or the other or both. Only by some such plan can the more complete utilization of timber of the region be realized.

Integration of industry in the production of the bulk of the forest products of the region is now fortunately in effect to a considerable extent. It has been pointed out that two-thirds of the lumber is produced by companies that not only own large tracts of timberland, but also engage in logging, and that the so-called sawmill of the region sometimes includes units for the production of planing mill products, shingles, lath, box shooks, cross arms, and similar mechanical forms. Grouped around the sawmills, usually located in the large centers of population, are general millwork factories for the manufacture of a large number of softwood products. A profitable market for products made from low-grade lumber doubtless would result in a further tying together of this branch of the industry, with consequent reduction in logging waste.

Through integration of industry a good start has been made in the utilization of lumber and box mill waste for paper pulp. A negligible amount of slabs and other mill waste has been used for years by the paper industry of the region, but it is only in the last three or four years that such waste has been used in considerable volume for pulp. Now practically all the pulp mills use some mill waste. It comes to the pulp mills in various

forms, such as slabs, sawmill and box factory trimmings and edgings, or pulp chips; more often the waste is converted into pulp chips at the sawmills, with the necessary chipping equipment installed by the pulp manufacturer. Almost without exception new plants have located with regard to supplies of mill waste. Complete integration was observed at one mill, the lumber and pulp and paper units being parts of one plant.

Two illustrations will serve to indicate the trend toward the tying together of the lumber and pulp-manu-



LOGS SALVAGED BY RE-LOGGING

One company, in four months, saved from the slash about 4,000,000 feet of logs like these.

facturing industries. In one case, the pulp mill is located between and near two sawmills operating box factories. The wood waste from the two factories is delivered to the pulp plant by auto truck, Sitka spruce and western hemlock box trimmings from a third factory being hauled about 20 miles by rail. Dumped into a trough, the waste is conveyed to a huge bunker. It is then moved by gravity to the wood room, where it is converted into pulp chips. Black knots, bark and other defective material are sorted out and utilized for fuel in the mill. Thus practically every piece of wood, no matter how small, is utilized.

Another more or less representative case will show the opportunity for utilizing mill waste for pulp on a large scale. A Douglas fir and a western hemlock mill, each under separate ownership and management and each producing about 275 thousand feet of lumber per 8-hour day, stand side by side on tidewater near an elec-



"Extended utilization of waste, particularly woods waste, will come. Just to say that utilization is economically not feasible merely begs the question and admits ignorance of how it may be profitably obtained."—Heritage.

tric power plant jointly owned by the two lumbering companies. Very near the hemlock sawmill, but representing an entirely separate unit so far as ownership and management are concerned, is a 150-ton sulphite pulp mill of substantial construction and modern design. Mill waste from the sawmills, principally the Douglas fir mill, in hogged form, serves as fuel for the power plant, with the latter supplying not only the light and power requirements of the sawmills and pulp mill but also a large part of the light for general use in the county. A very large proportion of the hemlock mill waste is converted into pulp chips at the sawmill, with the chips conveyed to the pulp mill at a minimum of cost and trouble; only the rotten material goes to the burner. Hemlock mill waste, formerly utilized for lath, is also converted into pulp chips.

RESEARCH

The trend in the forest industries of the region is toward the greater utilization of both mill and logging waste. To take the position that extensive utilization of this material is not economically feasible is an admission of a lack of knowledge of existing conditions. May it not well be that periods of financial depression suffered by the timber owners, loggers and lumber manufacturers of the region, together with their inability to put to profitable use the gigantic waste incident to logging and milling, are in large measure due to insufficient knowledge of existing and potential markets, the mechanical and chemical properties of Pacific Northwest woods and how best to utilize them? In any case, it must be admitted that research will contribute both directly and indirectly to the solution of the wood-waste problem. The following may serve to illustrate profitable fields of research:

First, is a thorough-going timber survey, by species, both quantitatively and qualitatively. This would show what material exists, where it is located, its relative availability, and how long it will last under existing methods and rates of utilization.

A study of the cost of gathering and transporting the logging waste to strategic points for possible conversion into useful products. Such a project should investigate the comparative value of various machines and methods designed for gathering waste wood as they relate to costs.

Investigations should also be made to bring out the quantity, form and character of existing waste in lumber manufacture, including accurate figures on the costs of segregating and assembling such material for conversion into pulp or other merchantable products.

In addition to the above, the interests of the Douglas fir region might well co-operate with other branches of the industry in a nation-wide statistical study of present lumber consumption by the various wood-using industries throughout the country. There is unquestionably a pressing need for up-to-date information on the requirements, as to species, grades and quantities of the wood-using industries generally. This would be especially useful in developing markets for low-grade lumber.

Studies could well be made for the purpose of developing improved logging equipment and operating methods, by means of which, at no additional cost, logging waste may be reduced.

Research for improving manufacturing processes and



FOUR EXAMPLES OF WASTED WESTERN HEMLOCK
Namely: A large-sized top, a broken log, a stump that is cut too high and standing trees of small size, all of which will be burned by the slash fire.

for the discovery of new commodities made from small and rough logs which might meet with general demand and a broad market, would also be of value.

Fortunately, research is not limited to improving the usefulness of wood as wood. There is the opportunity, through breaking wood up into its constituents and redistributing them, of creating a new fibrous, cellulosic, or chemical product. Most of the new uses for wood in the future will doubtless be developed along this line. It has already produced products of immense value, such as pulp and paper, synthetic wall boards, rayon, ethyl alcohol and many distillation products. For extending the usefulness of the region's woods for pulp and paper, three definite lines of attack have been suggested by the U. S. Forest Products Laboratory: The production of strong, light-colored papers from Douglas fir; the production of light-colored papers, requiring mechanical pulp, from western hemlock and the true firs; and the production of medium-quality, large-tonnage papers of various types by the mild pulping processes, and particularly the production of semi-sulphite papers from western hemlock and the true firs.



Sitka spruce stump cut low, showing no waste.

PACIFIC PULP & PAPER INDUSTRY

Table 14. - Comparison of Material Left in the Woods by Operators Logging on Competitively Smooth and Broken Ground

Class of Operation	No. of logging operations	Volume of Original Stand (Feet board measure per acre)	Log Transportation (Miles)		Material Left in the Woods After Logging (Feet board measure per acre)									
					Class 1 Sawlogs ²					Class 2 and 3 Sawlogs ²				
			Common	Carrier-owned	Douglas-fir	Western white-pine	Sitka spruce	Other	Total	Douglas-fir	Western white-pine	Sitka spruce	Other	Total
Logger-manufacturers logging on smooth ground	10	78,199	126,952	3,720	4,265	110,106				2,161	2,973	59	54	4,647
		Per cent	69.2	24.4	3.4	100.0				2.9	3.8	0.1	0.1	2.9
No. of trees	Vol. av. tree	29.7	56.1	0.5	4.2	70.8								
		2,530	746	7,460	1,015	1,561								
Logger-manufacturers logging on broken ground	10	72,956	121,019	1,658	4,514	100,147				4,559	3,145	14	191	7,909
		Per cent	72.9	21.0	1.6	100.0				6.2	3.4	0.0	4.2	7.9
No. of trees	Vol. av. tree	26.5	33.8	0.4	4.8	65.6								
		2,753	622	4,145	940	1,824								
Independent loggers logging on smooth ground	9	65,649	129,476	113,331	5,607	111,961				1,917	4,819	487	556	7,579
		Per cent	59.1	25.2	11.0	100.0				2.9	16.1	3.6	6.4	23.0
No. of trees	Vol. av. tree	19.5	47.1	2.3	3.4	72.3								
		3,469	604	5,796	1,680	1,562								
Independent loggers logging on broken ground	7	70,461	153,250	1,527	6,579	111,017				5,249	4,293	249	336	12,127
		Per cent	63.0	23.2	1.4	100.0				7.4	18.0	1.6	5.1	22.1
No. of trees	Vol. av. tree	15.6	41.9	0.5	4.2	62.2								
		4,517	793	1,091	1,566	1,798								

¹ Fractional board feet dropped. ² Working plan classification and not commercial log grades. ³ The sample acres in the case of several of the companies studied represent both the factors compared.

⁴ Small amounts of Port Orford cedar, larch, western white pine and sugar pine. ⁵ Per cent based on volume of individual species in original stand. ⁶ Per cent based on total volume in original stand.

Detailed explanation of this table was given by Mr. Hodgson in the installment entitled "Comparative Quantity of Logging Waste."

Unutilized Trees

Left After Logging in the Douglas Fir Region

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Editor's Note—This study on unutilized trees is supplementary to Mr. Hodgson's exhaustive work on "Logging Waste in the Douglas Fir Region," which has been published serially in this journal in the eight preceding issues. Data for the present article were gathered by Mr. Hodgson while conducting the logging waste study.

WHEN timber in the Douglas fir region is logged usually all trees valuable enough to pay their way to market are felled, bucked into logs, and taken out of the woods. To qualify as merchantable, a tree must be comparatively large and sound and of the right species. In addition to the merchantable trees there are in most stands of virgin timber large numbers of smaller, undesirable trees which are left unused by the loggers. The subject of this report is these unused trees. Many of them are mashed down when the larger trees are thrown; others are pulled over or broken when the logs are skidded to the railroad; the few that escape these processes and remain standing are generally killed when the slash is burned.

A study of these "undesirable," unused trees was made during the field seasons of 1926 and 1927, in conjunction with a logging waste survey on the logged-off lands of 24 representative and widely-distributed commercial logging operations, the combined annual output from which equalled one-fourth of all the logs produced in the Douglas fir region. These companies work under average conditions and in timber that is character-

istic of that being logged by the industry. The 150 sample-acre plots which served as the basis for the study were carefully selected to represent average conditions on freshly-logged-over lands and were examined before the slash was burned. The results, therefore, should represent a fairly dependable cross section of conditions in the commercial logging zone of the region.

Of the companies studied, four were logging only national forest timber under Forest Service timber sale contracts. A fifth company was logging partly in national forest timber and partly in privately-owned timber. All of the remaining companies were logging privately-owned timber only.

Since operators who are logging national forest timber must conform to certain federal utilization requirements which do not affect the activities of those logging private timber the two types of operations are treated separately in the following tables which summarize the findings of the study.

Table 1 represents the trees that were left after logging by companies who were cutting privately-owned timber. It shows that on the average these operators were leaving 24.1 trees per acre. The trees averaged 12 inches in diameter (D.B.H.), 71 feet in height and contained 225 feet, b.m., per tree. They totaled 4,983 feet b.m. per acre. Most of the trees were western hemlock, this species being represented by 20.7. There were



Photo by F. W. Cleator—U. S. F. S.

COMMERCIALLY-IMMATURE TIMBER LIKELY TO BE SACRIFICED FOR THE ONE LARGE TREE AT THE LEFT
Many young stands of timber in the average logging operation are destroyed and wasted for the sake of logging a few large trees, remnants of a former stand, which are growing with the younger trees.



Photo by H. M. Johnson

PATCHES OF RELATIVELY SMALL TIMBER LEFT AFTER LOGGING

These standing trees completely surrounded by slash are likely to be destroyed by fire when the slash is burned. With a little care they could be saved for continued growth and seed production.

only 1.9 Douglas fir trees and the remaining 1.5 trees were other species such as western red cedar and true firs.

Much variation was noted in the average number and size of trees that were left by the different companies. Company "B", for example, was leaving 31.7 trees per acre, which averaged 16 inches in diameter and totaled to more than 17,000 feet b.m. per acre. Company "D" was leaving 63.2 trees per acre, but these had an average diameter of only 10 inches, and Company "U" was leaving less than one tree per acre. These variations were due mostly to differences in the character of timber being logged, but the standards of utilization enforced by the company was also a factor.

Table 1 also shows that 20.1 of the trees left unused on an average acre were knocked down during logging and only four trees remained standing. The study shows that the trees left standing were, because of their character or position, of that class which will probably die and none of them were listed as ones that will live and serve as seed trees.

Table 2 represents the same information as does Table 1 except that it summarizes the findings of the study on the operations cutting national forest timber. It shows that on these areas, based on an average acre, 20.8 trees with an average diameter (D.B.H.) of 11 inches and a height of 64 feet were left

as waste. These trees had an average volume of 145 feet b.m., or a total volume of 3,076 feet b.m. It is shown that 18.4 trees per acre were knocked down during logging and that 2.4 trees which will probably die were left standing. The table also shows that 2.1 trees per acre which will probably live and serve as seed trees, were left standing. These trees averaged 33 inches in diameter (D.B.H.), 155 feet in height and 2,089 feet b.m. in volume.

Tables 3, 4, 5 and 6 show the trees of the various classes that were left after logging by diameter classes. These tables are based upon an average area of 100 acres in order to dispense with decimals.

The trees left by the loggers as waste are of two types. The first type is represented by suppressed trees which have been crowded and dwarfed in the development of the commercial stand and trees of tolerant species which have entered the forest as an understory, growing and developing in the partial shade of the larger timber. Most of the trees of this type are western hemlock with occasional western red cedar but in some localities true firs make up a considerable portion of this type. Some of the trees in this "understory" type are misshapened and more or less defective, but many are sound and contain good material.

The other type of unused trees are those which have become established either as individuals, as small groups, or as patches of trees covering from one or two acres to forty acres or more. Such trees occur in natural openings of the forest, the result of deadenings caused by fire, insects and wind storms. The trees of this "young, second-growth" type are represented in varying percentages by thrifty specimens of all the species common to the region. They are sound and except for small knots contain very good material, which if left to grow, would quickly develop into valuable timber.

Conditions within areas of this type are not always the same. In some stands all of the trees may be about the same size, all

Instead of mowing down small trees in the course of operations the logger can take advantage of the 20 to 80-year lead which nature has given him toward keeping his land productive. With only nominal expense and trouble he can keep and hold the rapidly developing young timber for continued growth and later harvest.

TABLE 3—Number of Trees Pulled Down and Left After Logging in the Douglas Fir Region as Waste
(Based on an average area of 100 acres)

Character of Operation	Diameter Class—Inches D.B.H.												
	5 to 7	8 to 10	11 to 13	14 to 16	17 to 19	20 to 22	23 to 25	26 to 28	29 to 31	32 to 34	35 to 37	38+	Total
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Private timber	395	715	405	249	128	71	24	10	4	5	2	2	2,010
National forest timber	372	660	470	266	30	22	—	4	4	—	4	8	1,840

TABLE 4—Number of Trees Left Standing After Logging in the Douglas Fir Region that will Probably Die
(Based on an average area of 100 acres)

Character of Operation	Diameter Class—Inches D.B.H.												
	5 to 7	8 to 10	11 to 13	14 to 16	17 to 19	20 to 22	23 to 25	26 to 28	29 to 31	32 to 34	35 to 37	38+	Total
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Private timber	66	108	80	45	42	28	13	9	2	1	—	6	400
National forest timber	22	58	87	30	39	—	4	—	—	—	—	—	240



Photo by H. R. Spelman, U. S. F. S.

TOMORROW'S FOREST BEING SACRIFICED FOR A FEW OLD VETERANS

The logger in this case is taking out the few large trees to be seen on the skyline, amounting to 2 or 3 trees per acre. All of the second growth (40-year-old Douglas fir), as illustrated in the foreground, is destroyed during logging and left as waste.

being too small to log with profit; in other cases some of the trees may be considerably larger than the others, a few perhaps being commercially mature and large enough to utilize as sawlogs, while most of the stand is as yet too small for this purpose.

Within still other areas a few (two to ten per acre) very large trees, remnants of the former stand, may be found in mixture with the young second growth. In nearly all cases these patches of relatively small timber, from 20 to 80 years of age, are surrounded by the older and larger stands of timber which loggers will take out.

The use which might be made of unused trees in the two types presents altogether different problems. In the case of the "understory" type it is a matter of immediate utilization or a complete loss of the material, since the large timber can not be harvested without destroying the smaller trees.

It is claimed that the value of the smaller trees will not justify the cost of logging them with the machinery and methods required for moving the heavier logs. The only other recourse is to log the virgin timber by a two-step method, which would mean pre-logging or re-logging with small inexpensive equip-

ment ahead of, or after the major logging operation. This has been done successfully in a few cases, and with a slight increase in the value of logs the use of two-step logging methods will no doubt increase.

On the other hand, when the logger finds patches of the "small, second-growth" type, he may choose to adopt one of two methods. He can follow the usual practice and fell the large trees into these young stands and mow them down with heavy cables as he skids the large logs through them. If this is done he will sacrifice all of the commercially immature trees for the few of usable size or the few old veterans mixed with the young timber and he will then burn what still remains of the second growth with the slash fires following logging.

Or, he can take advantage of the 20 to 80-year lead which nature has given him toward keeping his land productive. If he adopts this policy he will take the necessary steps to protect these young stands of timber against the destroying effects of uncontrolled logging and fire. With only nominal expense and trouble he can keep and hold this rapidly-developing young timber for continued growth and later harvest.

TABLE 5—Number of Trees, Standing and Knocked Down, Left After Logging in the Douglas Fir Region as Waste
(Based on an average area of 100 acres)

Character of Operation	Diameter Class—Inches D.B.H.												Total
	5 to 7	8 to 10	11 to 13	14 to 16	17 to 19	20 to 22	23 to 25	26 to 28	29 to 31	32 to 34	35 to 37	38+	
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	
Private timber	461	823	485	294	170	99	37	19	6	6	2	8	2,410
National forest timber	394	718	557	296	69	22	4	4	4	—	4	8	2,080

TABLE 6—Number of Trees Left Standing After Logging in the Douglas Fir Region that will Probably Live as Seed Trees
(Based on an average area of 100 acres)

Character of Operation	Diameter Class—Inches D.B.H.								Total
	14 to 19	20 to 25	26 to 31	32 to 37	38 to 43	44 to 49	50 to 55	56 to 62	
Private timber	—	—	—	—	—	—	—	—	—
National forest timber	30	39	26	65	17	26	9	—	212

Table 1. - Trees Left After Logging by Operations Cutting Privately-owned Timber in the Douglas Fir Region
(Reduced to an average acre)

[illegible]

100

Trees that will probably live as seed trees are not included. 2
 They probably be killed by the slash fires and will become snags.

Will probably be killed by the slash fires and will become scarce.

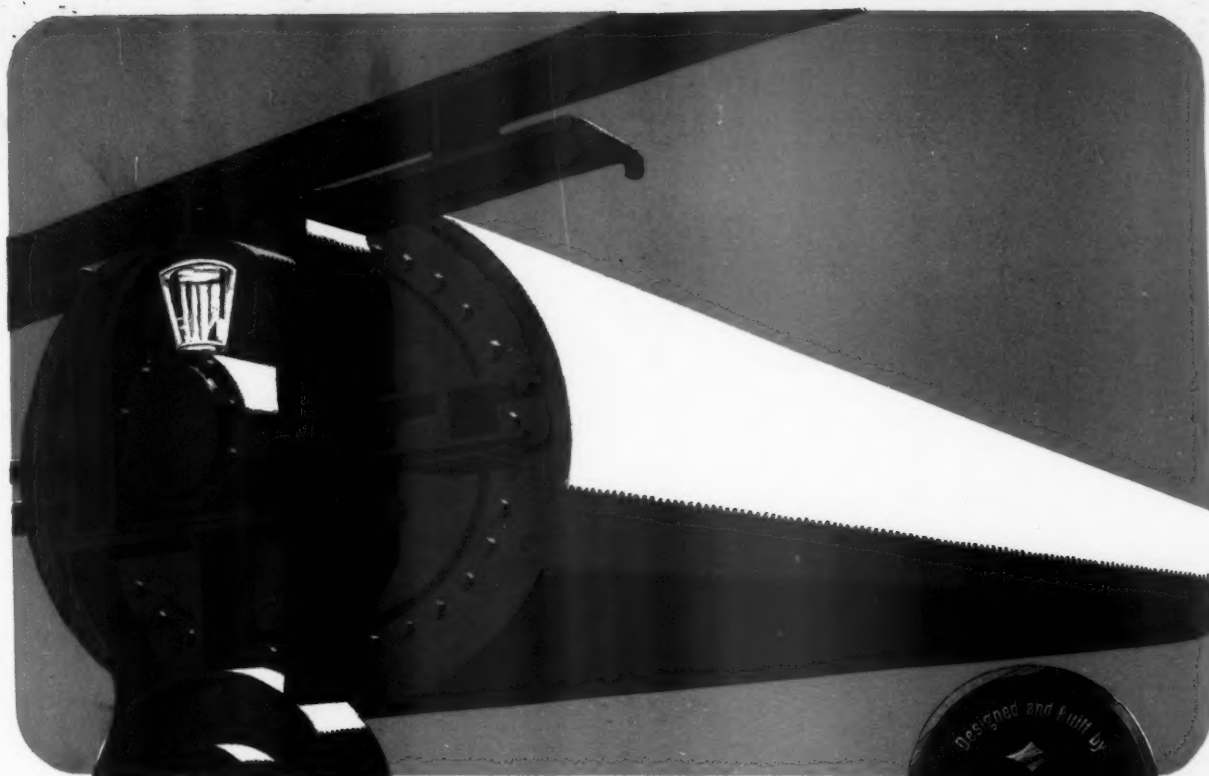
Table 2. - Trees Left After Logging by Operators Cutting National Forest Timber in the Douglas Fir Region
(Reduced to an average acre)

[illegible]

.....

Trees that will probably live as seed trees are not included.

[illegible]



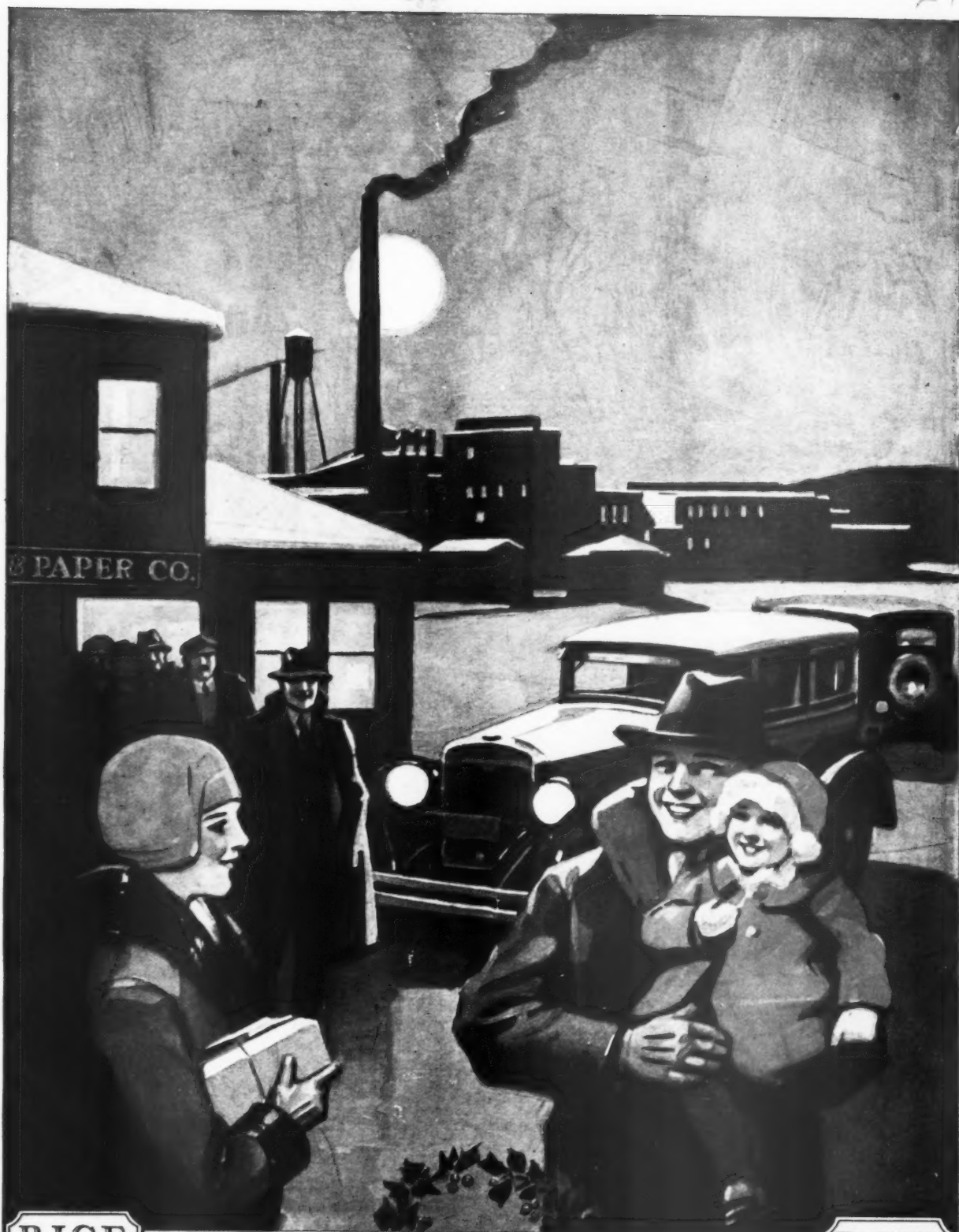
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